

June 5, 1939

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882

STRIP AND SHEETS GIVE YOU
PRODUCTION AT LOW COST

led under careful
abs of controlled
Strip and Sheets
ing qualities.
Controlled finish-
inspections assure
the correct sur-
combined in one
qualities that give
production and
amping and form-
& L Strip and
from their better



J & L—PILOTS THE COURSE OF
CONTROLLED QUALITY IN STEEL

ACQUHLIN STEEL CORPORATION

STEEL WORKS
PENNSYLVANIA

IN PROGRESS TO AMERICAN INDUSTRY

**J&L
STEEL**

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WORKS PROGRESS ADMINISTRATION

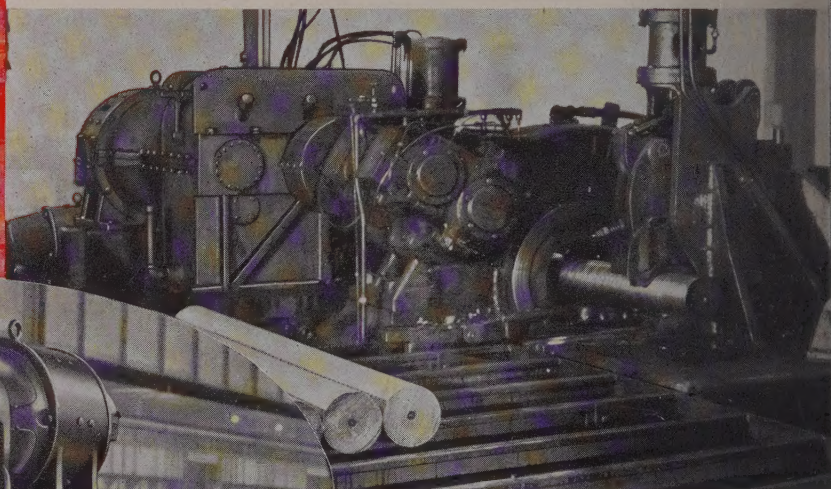
On-the-Job Results win Tube-Mill Appli- cations for *Reliance Motors*

No class of users has shown a more steady 34-year record for repeat purchases of Reliance Motors than the tube mills. They have used a lot of these rugged motors, worked them hard and found that they stand the pace.

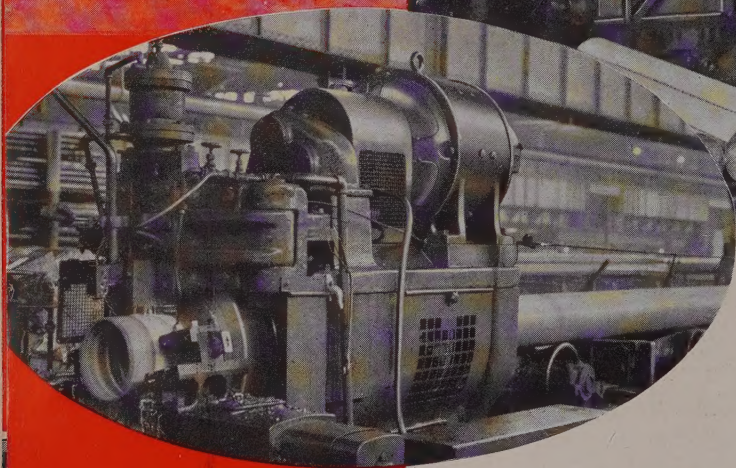
These installations have been under the eyes of men who know motors of all types from shaft to eye bolt—men who

watch maintenance costs for good reasons for good operation.

To build motors which make better records on the job, making we have drawn on our practical experience of the engineers. Their advice has brought a constant improvement in the duty motor to their mill.



↑ Three Adjustable-speed Type T Heavy-duty motor driving a billet peeler which "skins" round billets to produce tube. A 150/200 hp. 450-1200 rpm. motor drives the 25 hp. 200-1200 rpm. motors are used for the peeling. Youngstown Sheet & Tube Company.



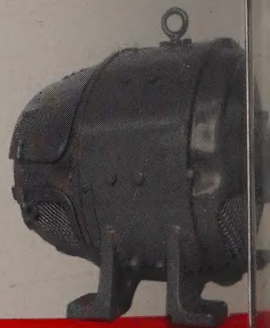
↑ Cutting-off Machine driven by an Adjustable-speed Type T Reliance Motor. This rugged motor is carefully protected and insulated to withstand the unfavorable conditions common to many tube-mill applications.



RELIANCE ELECTRIC & ENGINEERING CO.

1087 IVANHOE ROAD

CLEVELAND, OHIO



Birmingham, Boston, Buffalo, Chicago, Cincinnati, Detroit, Greenville (S. C.), New York, Philadelphia, Pittsburgh, St. Louis, San Francisco, Syracuse (N. Y.), and other principal cities.

RELIANCE ^{AC} _{DC} MOTORS

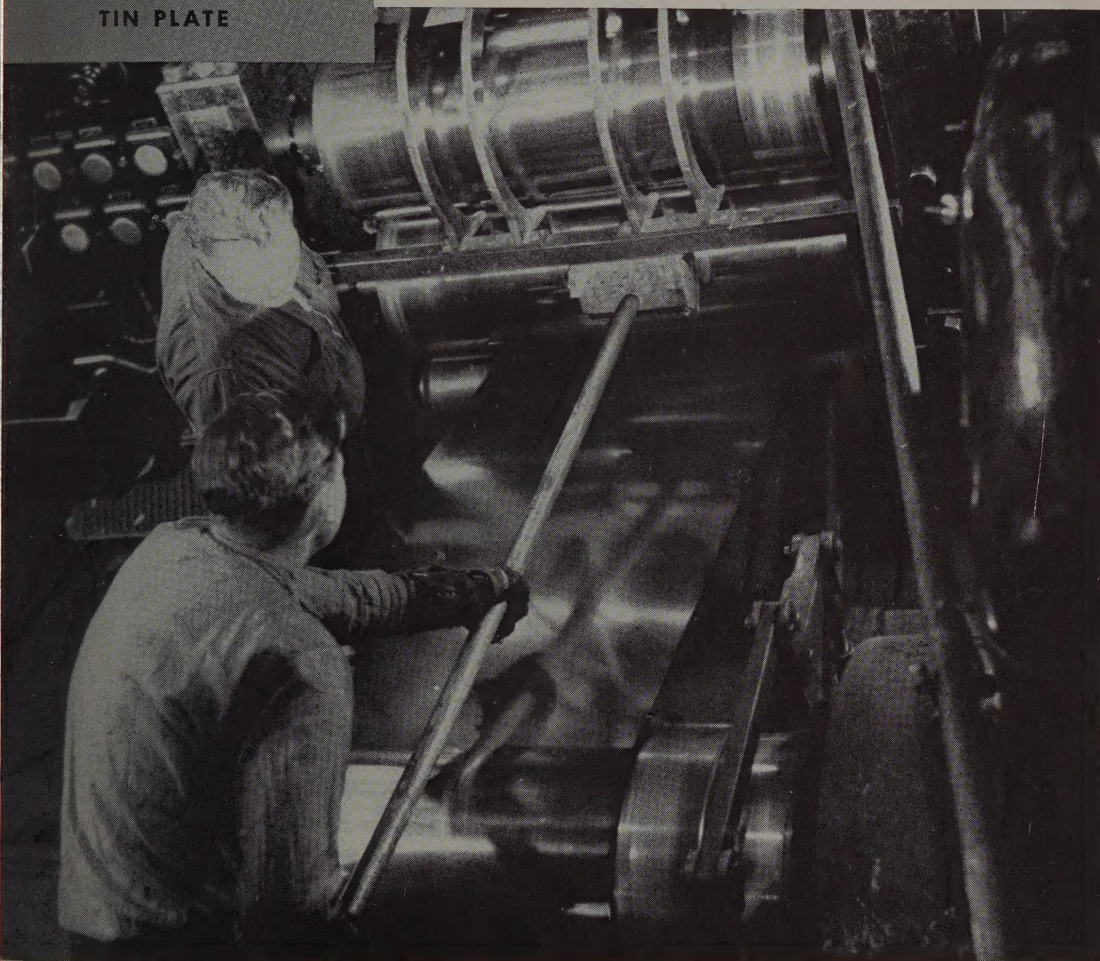
Quality

BETHCOLITE

TRADE MARK

COLD REDUCED
TIN PLATE

TIN PLATE



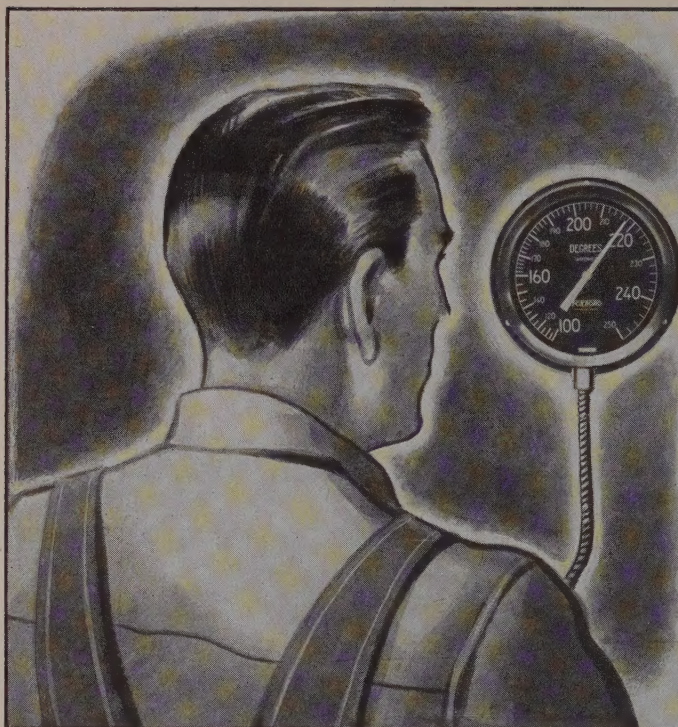
ern equipment is an important key to the quality of BethCoLite. At Bethlehem's
land plant the entire manufacturing unit is up-to-date in every detail. A modern
uous hot mill supplies the strip. Two five-stand tandem mills, representing
test developments, cold reduce it. New, automatic tinning machines coat it.

BETHLEHEM STEEL COMPANY



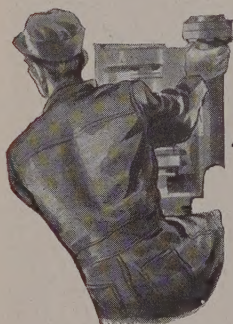
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WORKS PROGRESS ADMINISTRATION



You're Always
"FACE TO FACE"
 with cost-reducing facts

no eye strain



no contortions



no tricks

FOXBORO

REG. U. S. PAT. OFF.

RECORDING / CONTROLLING • INDICATING



Instruments

TEMPERATURE • LIQUID LEVEL
 PRESSURE • FLOW • HUMIDITY

with
mono-therm
INDICATING THERMOMETERS

Easily read, accurate temperature facts mean savings. You can read Foxboro mono-thermometers easily even from a distance of 200 feet. The figures and graduations are white on black background free from highlights. A single leading pointer indicates exact readings. It is unnecessary to take readings in obstructed or illuminated surroundings because the indicator is located as much as two-hundred feet from the bulb. This enables you to bring it out from a maze of pipes out of dark corners — and at any desired level. Type thermometers are responsive, accurate, and unfailing service. Each instrument is accurately calibrated—not at just one midway check point, but throughout the entire scale. From bulb to spring the thermal system is an integral metal unit. > > > Every Foxboro instrument embodies exclusive advantages—in readability, speed and long-life—developed by Foxboro experience. Accept only the best in thermometers. Specify Foxboro and be sure. Write for Bulletin.

THE FOXBORO COMPANY

118 Neponset Avenue, Foxboro, Mass., U. S. A.

Branch Offices in 25 Principal Cities



THOUSAND YEARS AGO MAN TURNED TO STEEL FOR PROTECTION

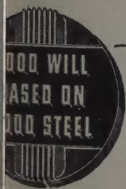
Man's earliest recognition of the value of steel as a life protector was in the making of body armor. Today millions owe their personal safety to the development of alloy steel and its use in the manufacture of automobiles, buses, airplanes and railway trains.

The progress made in the production of alloy steel in the United States during the last 25 years has made this period one of the most spectacular in the entire history of steel manufacture. Within this comparatively brief space of time, through the constantly increasing use of scientific methods of research and manufacture, TIMKEN Alloy Steel has risen to a position second to none in its field. The reputation for quality and uniformity which TIMKEN Steel and TIMKEN Seamless Steel Tubing have achieved merits the consideration of every steel user.

Alloy Blooms, Billets
and Bars

Carbon and Alloy
Seamless Tubing
and Fine Steels
Stainless Steels

Open Hearth and
Electric Furnace
Quality



THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
Steel and Tube Division

TIMKEN

ALLOY STEELS

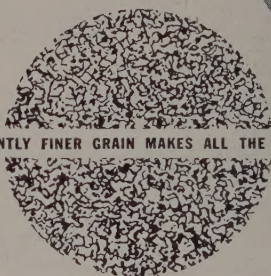
NATIONAL STEEL HIGH TENSILE ALLOY

**SOLVES YOUR MOST DIFFICULT
COLD-FORMING PROBLEMS**

BY ITS EXCEPTIONAL **Ductility**



ITS INHERENTLY FINER GRAIN MAKES ALL THE DIFFERENCE



Unlike other high tensile steels, National Steel High Tensile Alloy has unusual ductility and can be cold-formed readily into the most difficult shapes.

This ductility, which means so much to the engineer or fabricator with a cold-forming problem in his plant, is the result of an inherently finer grain and a balanced alloy composition.

To high yield point, high ultimate strength, high resistance to fatigue and impact, weldability, corrosion resistance and other desirable properties of high tensile steels, National has added another—ductility or workability. And because

this ductility is exactly what so many have been seeking, National Steel High Tensile Alloy is rapidly and continuously opening up important new fields of application.

If you have a cold-forming problem preventing you from receiving full benefit of the established advantages of high tensile steel, consult our engineers. They will be glad to show you how the ductility of National Steel High Tensile Alloy will meet your special requirements.

National Steel High Tensile Alloy is available in sheets, strip, plates, bars and shapes.



GREAT LAKES STEEL CORPORATION • DETROIT, MICHIGAN

DISTRICT OFFICES: *Boston*, 1001 Statler Building; *Buffalo*, 1000 Walbridge Building; *Chattanooga*, Hamilton Bank Building; *Chicago*, 1000 North Dearborn Building; *Cleveland*, 820 Leader Building; *Dayton*, 846 Third National Bank Building; *Indianapolis*, 1215-17 Circle Tower; *New York*, 40 Wall Street; *Philadelphia*, 407 Liberty Trust Building; *St. Louis*, 3615 Olive Street; *San Francisco*, 824 Sharon Building; *Toledo*, 906 Edison Building.

DIVISION OF

NATIONAL STEEL CORPORATION

HOW TO HANDLE



From presses at the right of the picture, hot steel automobile accessories drop into the quenching tank onto this Rex Apron Conveyor which carries them to the oven at the left.

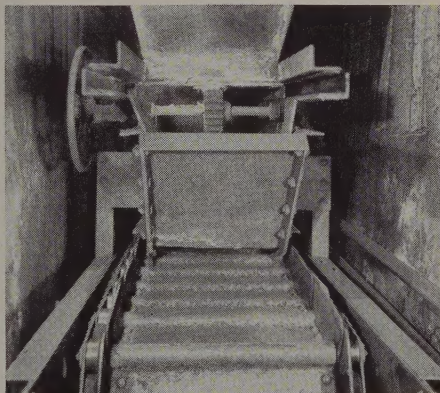
IF IT IS HOT STEEL

A tough job this—receiving all sizes of white hot steel units as they drop from the press—taking them through the quenching tank and into the oven. It's a job where the load is never constant—where

can't be interrupted by time-wasting, costly repairs.

One of these conditions is an added reason for turning the job to the Rex Steel Apron Conveyor. With its rugged design, its true formed pans on Rex Chabelco Steel is Rex Conveyor asks no quarter and gives none on the toughest conveying jobs. Used in hundreds of applications, handling everything from hot clinker to abrasive castings, Rex Conveyors are likely to be the solution to your conveying jobs. Write for the comprehensive new folder, from stock on chains, sprockets and transmission equipment.

REX CHAINS and CONVEYORS
CHAIN BELT COMPANY of Milwaukee



Rex Apron Conveyor installed in a new power plant. This conveyor is built with or without the leakproof aprons—for handling lumpy or granular materials or bulk parts.

Free for you! "How to Handle IT If It Is Coal, Coke, etc." has specifications and detailed design data to use when adapting Rex Apron Conveyors to your handling system. Use this coupon.

Chain Belt Company, Apron Conveyor Div.
1660 W. Bruce St., Milwaukee, Wis.

Gentlemen: Please send me my copy of the book, "How to Handle IT If It Is Coal, Coke, etc."

Please have a Rex Apron Conveyor engineer call. (Check which.)

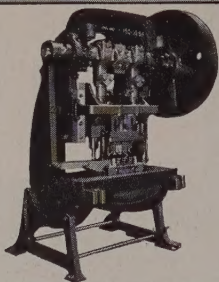
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By _____ Title _____

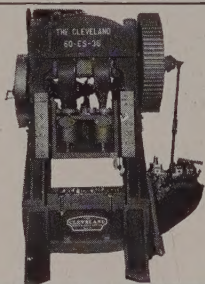
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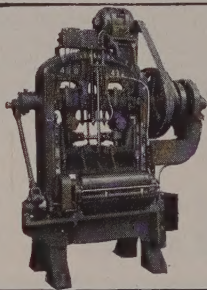
One sure way to step up production



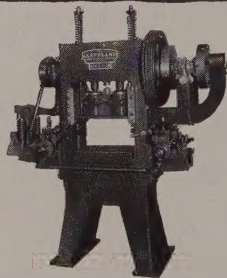
Shuttle feed for the production of steel bushings.



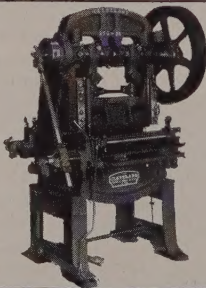
Single Roll feed 6" wide material from 0 to 11½" long.



Single roll feed for 40" wide material from 0 to 4" at 250 strokes per minute.



Double roll feed with automatic scrap cutter for high production of small articles.



Double roll feed for 28" wide material, 9" maximum length at 120 strokes per minute.

use CLEVELAND PRESSES equipped with Automatic Feeds

The illustrations show various types of Cleveland Automatic Feeds and their adaptation to different types of Presses.

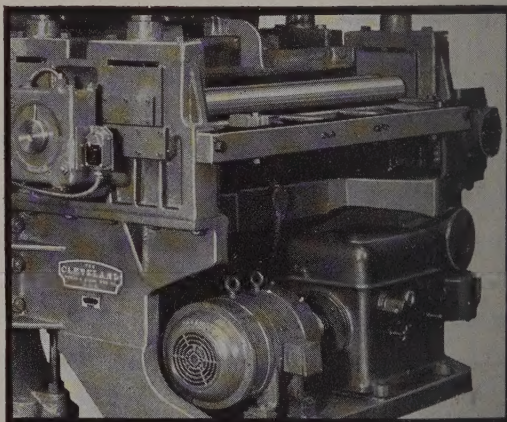
While these feeds were developed to meet the individual requirements of the concerns to whom they were furnished, were, therefore, necessarily limited to suit the work for which they were designed, they can, in most instances, be adapted to suit other needs.

Roll Feeds can be applied to Presses in various ways. They can be mounted on the right and left hand side of the Press and used either as single or double Feeds. They can be mounted on the front or back of the Press and the material fed from front to back or vice versa.

Automatic Feeds not only step up production and reduce manufacturing costs but the work is consistently accurate and there is usually less waste material.

If you are interested in the application of Automatic Feeds to your present equipment or are contemplating the purchase of new Presses, our Engineering Department will be glad to submit their recommendations for your consideration.

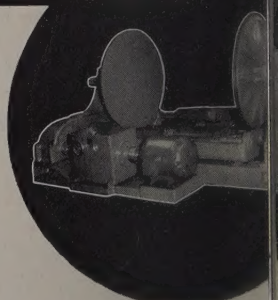
The Cleveland Punch & Shear Works
3917 St. Clair Ave. Cleveland, O.



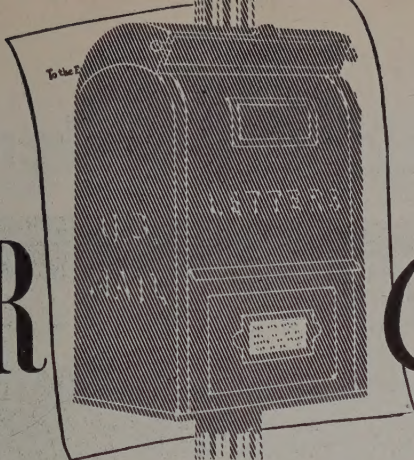
This illustration shows a Cleveland self-contained heavy duty Uncoiler. This unit, which is made in various sizes and capacities, takes a 72" wide coil weighing 12½ tons. It is driven through a variable speed hydraulic unit and can be connected in with the starting and stopping mechanism of the feed table so that both will operate simultaneously. The Uncoiler is of the cradle type and is provided with adjustable end guides to accommodate various widths of coils.

Cleveland Uncollers can be furnished in sizes to suit particular requirements.

This unit is a double supply leveler, leveling the material as it reaches the feed table. It can be used in various ways to work on the material. It can be used in the automatic operation of the machine. It can be used in the manual operation of the machine. It can be used in the automatic operation of the machine. It can be used in the manual operation of the machine.



LEADER



Comments

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief—preferably not exceeding 250 words.

not Jobber

or:
e to time a considerable
ur members have advo-
e of the terms "steel
"distributor," or "ware-
eu of the word "jobber"
ng of those engaged in
tion of steel through

, the point is that the
ouses are not jobbers as
they sell directly to con-
not to retailers as does
ation or enterprise be-
manufacturer and the re-
oppose, too, that the mid-
ughout all the ages has
t to so much criticism
a seemingly unearned
e word "jobber" has be-
eful to many.

we are asking you to
long established custom,
less I know many of
r companies will be
your help and co-oper-
inating from market re-
news stories the word
applied to the distribu-

WALTER S. DOXSEY
ecretary,
eel Warehouse Associa-
and.

the Stockholder

or:
e forgotten men, and
use a phrase much in
cently as a political
the industrial stock-
been coming to the
y the past few months.
ople who have saved
llars to invest in manu-
company stocks, thus
pportunity for employ-
ousands, have seen the

wages of their money shrinking
year by year.

T. M. Girdler touched on one
phase of this situation in ad-
dressing the American Iron and
Steel institute, (STEEL, May 29, p. 18)
the sale of steel at or below pro-
duction cost. With heavy tax bur-
dens and higher wage rates the
load on the industry is sufficiently
high to give management a prob-
lem in making a profit to give an
honest return to stockholders,
without throwing away possible
gains in indefensible price-cutting,
such as was seen last fall and
again a few weeks ago.

Mr. Girdler's remarks were
marked by moderation and re-
straint and pointed out clearly the
obligation that rests on sales or-
ganizations to sell at a profit, to
pay fair wages for the money in-
vested in the business. Labor is
well looked after and receives a
larger portion of earnings than
ever before but the stockholder
seems to have been forgotten,
though his claim to wages on his
investment is as real as that of
the worker.

It is heartening to hear the clear-
cut opinion of a leader in the steel
industry that policies should be
shaped to afford a profit instead of
throwing away good money in price
cutting. Stockholders too often are
inarticulate and unorganized, leav-
ing policies entirely to officers, on
whom they have little influence.
Sentiment is growing among this
class to assert their rights and
management will do well to heed
the signs of revolt against the
present situation. Far-sighted ex-
ecutives, like Mr. Girdler, have
sensed the unfairness of the situa-
tion and are doing all they can to
rectify it.

HENRY C. TAYLOR
New York

Spreading Machine Facts

To the Editor:

That machinery does not cause un-
employment should be made clear
by the figures being quoted by those
who know, before various gather-
ings. In your May 29 issue of STEEL
I note two outstanding instances of
this effort to catch up with the pop-
ular misapprehension on this point.

Edward R. Stettinius Jr. on page
25 and Bennett Chapple on page 27,
one addressing the temporary na-
tional economic committee and the
other the National Association of
Purchasing Agents, adduced actual
figures from their experience to
show the opposite is true, that in the
last analysis more men are em-
ployed as use of machinery grows.

I think it is too bad that thinking
men outside the ranks of industry
cannot be made to know the truth
of this situation. So much ballyhoo
has been spread by politicians with
an ax to grind that the man in the
street and many men in offices
really believe men have been dis-
placed by machines. When someone
devises a method for spreading the
truth in a way to catch up with the
error it will go far toward clearing
up a lot of loose thinking by people
who take their opinions readymade.

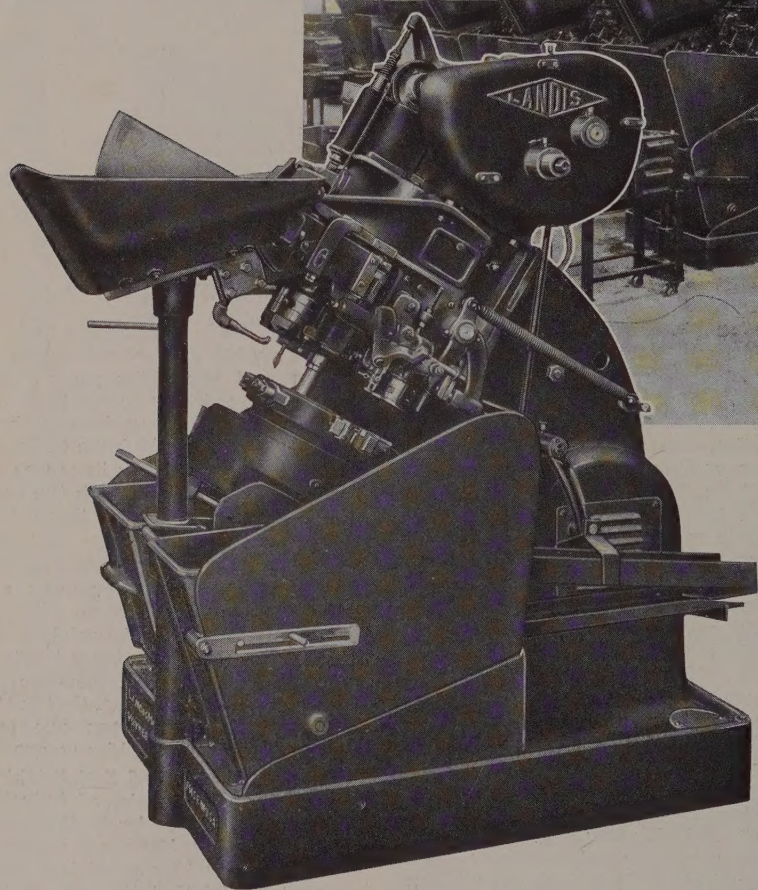
Mr. Stettinius called attention to
one feature not so well known, that
today's steel product requires a
much greater degree of processing
than in past years, especially in flat-
rolled steel.

It might be added that fabrication
of these forms of steel require much
more employment than was needed
by cruder steels of former years,
thus again adding to the number of
men gainfully employed.

WILLIAM MORGAN
Chicago

more Production greater Accuracy

when using—



The LANDIS Automatic Forming and Threading MACHINE

One operator and a helper services the battery of 6 LANDIS Automatic Forming and Threading Machines illustrated above. An example of the production which may be expected from these machines is illustrated by the results which are obtained when threading cap screws. Cutting 7/16" dia. 20 pitch N.F. threads on cap screws made from 1420 SAE steel, one machine averages 1080 pieces per hour. Threads are held to class 3 specifications.

Efficient in operation and thoroughly modern in design—the LANDIS Automatic Forming and Threading Machine should be used to LANDISize your THREADS.

WRITE FOR BULLETIN No. E-70

LANDIS MACHINE CO., Inc.
WAYNESBORO, PENNA.



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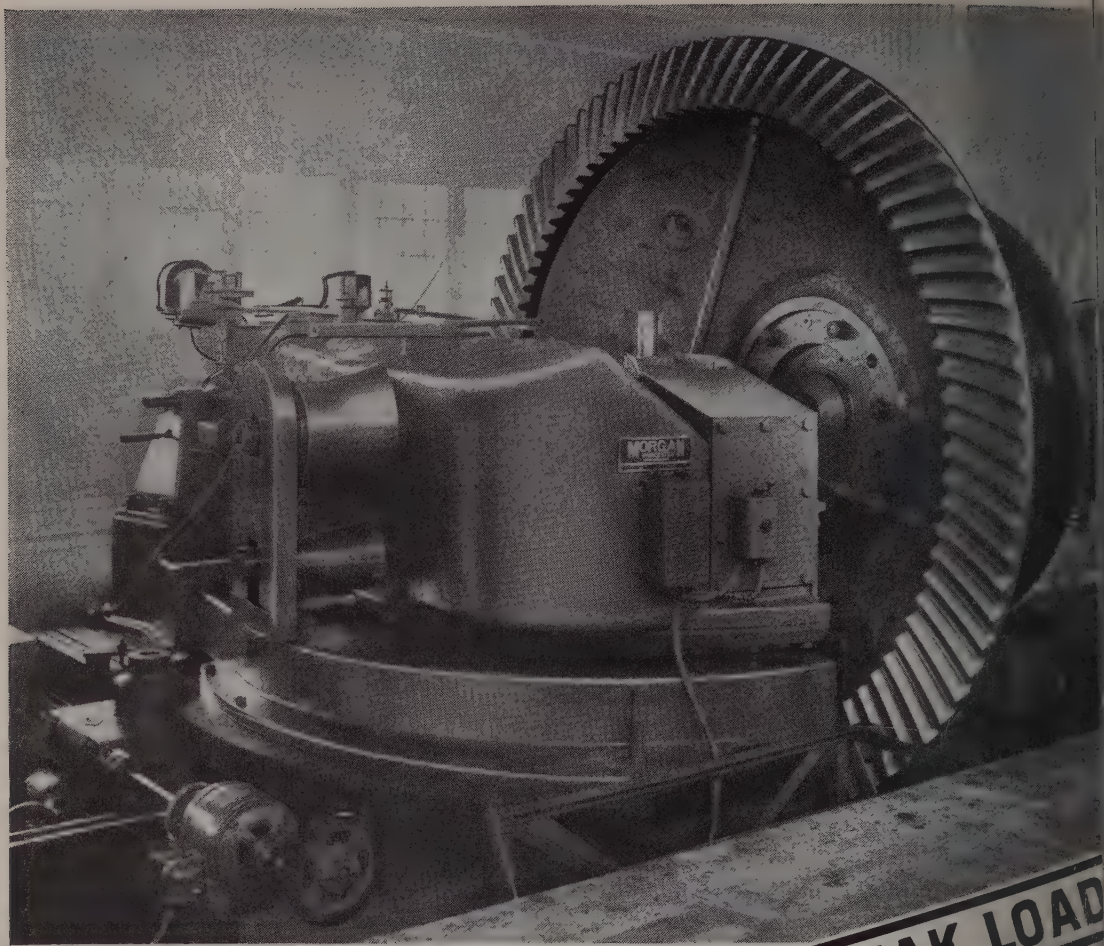
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PRODUCTION • PROCESSING • DISTRIBUTION • USE



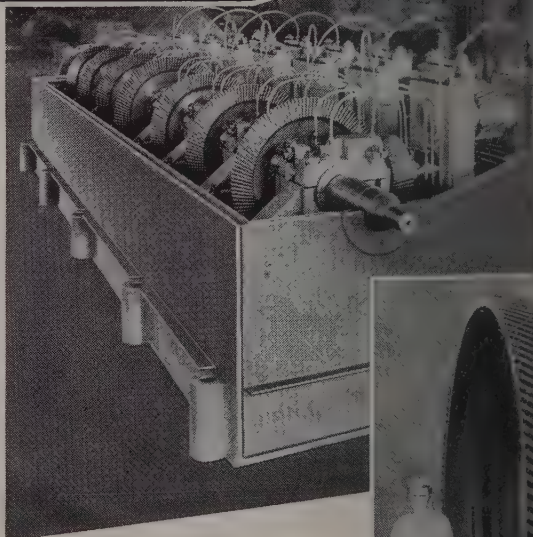
CAN YOUR DRIVES HANDLE PEAK LOAD

Morgan Continuous Rolling Mills have always been powered for the peak loads. In 1920 Morgan engineers, recognizing the unquestioned superiority of accurately cut spiral bevels over straight spur bevels, designed and built the first spiral bevel gear planer. Its success was such that a second similar machine with even greater range was built. For capacity and range of control these machines are still unequalled. One of them is shown here putting the finishing cut on a typical Morgan Spiral Bevel Bell Gear 140.056" P.D., 88 teeth, 5" circular pitch, 13" face. The largest spiral bevel gear so far produced on this machine has a pitch diameter of 160.428", 84 teeth, 6" circular pitch and 20" face.

Can your drives handle peak loads? A Morgan Report will locate the trouble and point out the answer.

**MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS**

R-52



LET



REMOVE THE LAGS

STEEL

PRODUCTION • PROCESSING • DISTRIBUTION • USE

The Editor s the News

in steelmaking continued upward last
the rate of production (p. 21) moved up
52 per cent of ingot capacity. Elation
improvement is tempered by indications
tion over the next 30 days (p. 81) will
the steelmaking trend. Structural shape
reinforcing bar awards are more ac-
cording awards will attain a new peace-
n 1939 (p. 22); at least 350,000 tons of
consumed under this classification this
ses of tonnage against sheet and strip
tly booked (p. 81) accounted for much
k's rise in steel production. Holiday
and the Briggs strike (p. 29) bogged
mobile assemblies badly last week.

ngton (p. 25) divergent viewpoints, be-
look for the new tax law and for neu-
lation. Fate of contemplated Wagner
act revision is in doubt. Last
Thursday members of the com-
merce department's business ad-
visory committee dined with the
President; the subject (p. 26) was
s economic condition and the problems
ital and unemployment. The President
rther conferences of the same character
or other business groups. . . . Pennsyl-
) has joined the ranks of the states out-
ain objectionable tactics on the part of
. . . . Research in steel technology for-
ucted by the Association of American
facturers (p. 21) has been transferred
ican Iron and Steel institute.

workers that their real hope for pros-
n the revival of business," was the mes-
d by Millard E. Tydings, United States
senator from Maryland, at the
forty-eighth general meeting of
the American Iron and Steel in-
stitute. He urged that industrial
leaders (p. 15) educate wage-earn-
fact. . . . This year's "triple mill supply"
took the form (p. 19) of a cruise to
Reciprocity was denounced by joint resolu-

tion. It will take the federal trade commission many
years, it was predicted, to eliminate practices pro-
hibited by the Robinson-Patman act. Despite fair
trade laws, resale prices that have held strongly
for 12 to 15 years have become demoralized dur-
ing the past year on a number of lines.

♦ ♦ ♦
This week's contributor to STEEL's Forum on Re-
employment (p. 38) came up through the shop. He
is Walter B. Van Wart, executive vice president,
Wyatt Metal & Boiler Works, Dal-
las, Texas, and he feels the Amer-
ican workingman is apt to forget
that if the profit system were de-
stroyed in this country his posi-

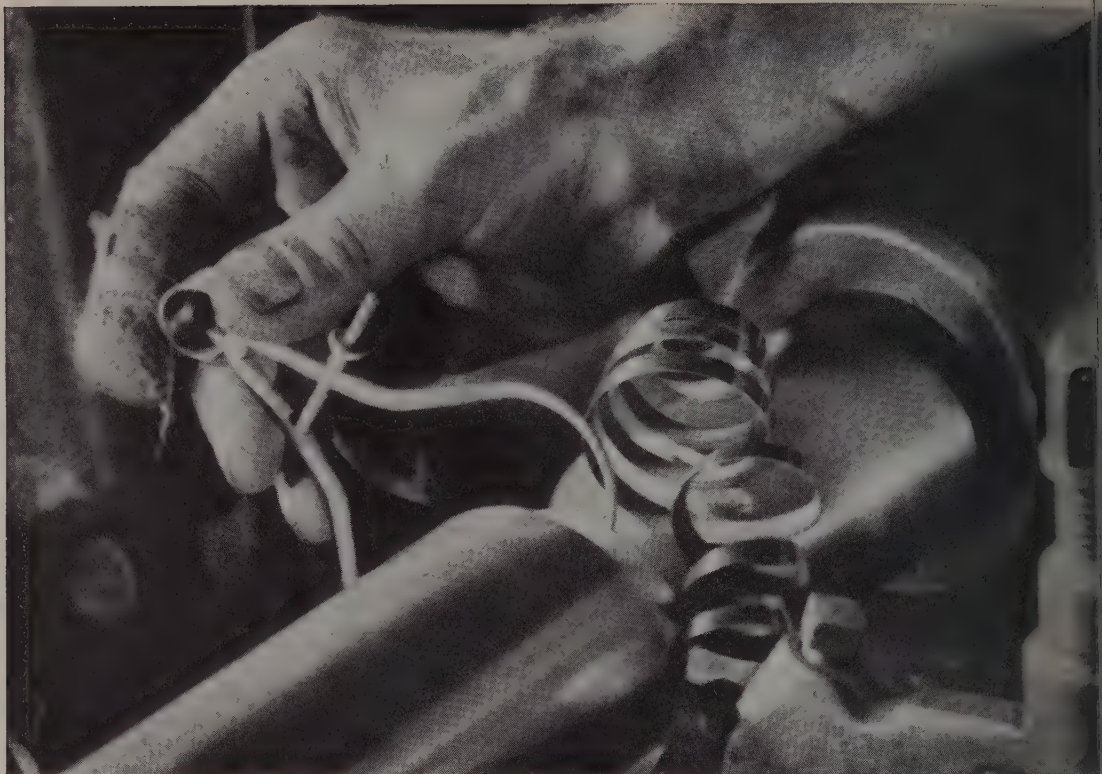
Sees Profit Mandatory

tion would become far worse. There is great need,
he feels, for education of public opinion so that
federal and state governmental policies may be
changed so as to bring lasting business recovery and
re-employment. . . . A. J. Westphal, Atlas Steel
Casting Co., Buffalo, outlines (p. 40) a policy of co-
operation between buyer and seller of steel castings
so that the former may derive full advantage of the
numerous possibilities of steel castings.

♦ ♦ ♦
A completely mechanized overhead handling sys-
tem is one of the features of a plant laid out (p. 42)
for high production manufacture and assembly of
automobile lamp parts. . . . Many
factors influence the coefficient of
friction of a material. An engineer
(p. 46) set forth test results that
should guide design and application
engineers in a sound interpretation of data. . . . In-
teresting use of high frequency induction furnaces
(p. 49) is the heating of small motor laminations for
melting thermoplastic cement while the laminations
are under pressure. . . . Motion studies (p. 52) show
how spray-guns can be used with less fatigue while
at the same time increasing production and improv-
ing quality. . . . Good research results (p. 62) are
obtained with an experimental open hearth furnace.

System Is Mechanized

EC Krenzberg



Certified Steels Help Lower Labor Costs

Labor costs, rapidly becoming today's No. 1 consideration, are in a measure dependent on materials. On most jobs where steel is used, shop costs are the largest and most variable single factor. While the cost of steel itself is relatively small, the quality plays a very important part in the control of these shop labor costs. If it is hard to fabricate—does not work uniformly—has hard spots to dull or break tools—or in the case of alloys, does not respond properly to heat treatment—then shop labor

hours pile up and the job ticket shows.

To meet this growing need for more reliable better fabricating steels, Ryerson does and built up stocks of CERTIFIED STEEL steels that represent the highest quality in each class and type of material. Users report savings in time, reduction in waste and lower labor costs.

Perhaps Ryerson Certified Steels can help you reduce costs. Why not try them on your next job?

RYERSON

Joseph T. Ryerson & Son, Inc. Plants
Milwaukee, St. Louis, Cincinnati, Detroit,
Buffalo, Boston, Philadelphia, Jacksonville



Principal products in stock for Immediate Shipment include—Bars, Structural, Plates, Iron and Steel Sheets, Tubing, Shafting, Strip Steel, Alloy Steels, Tool Steels, Stainless, Babbitt, Welding Rod, etc.

Certified

STEEL

Workers Real Hope for Prosperity Lies in Business Revival"

By **MILLARD E. TYDINGS**

United States Senator
from Maryland

tinctive honor and a
asure to be asked to
distinguished gather-
ans. Here are repre-
aders of one of the
ies of our country.
you tonight, I shall
mments upon the na-
s recent past and its
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undance of our great
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ould be discarded and
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that at first the cumu-
of experiments, both
did not deliver its full
ur economic life.

Sound Remedies

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national economy. At
of the depression in
tional debt was less
s of dollars. Today, it

How much is 45 bil-
rs? Well, if we were
ng off this debt at the
million dollars a year,
e five generations of
izens to discharge it

t charge on our nation-
e is now more than
dollars a year. If we
n at once a policy of

he annual dinner, forty-
meeting, American Iron
ute, New York, May 25.



Photo by Bachrach

Senator Tydings

paying current interest on the debt
and decreasing that debt in princi-
pal 500 million dollars a year, it
would consume 25 per cent of our
present entire federal income for
90 years. The interest on the na-
tional debt takes 17 cents out of
every dollar which the people pay
in federal taxation.

It would take three generations,
or 60 years, to bring down our
national debt to where it was eight

years ago, if it were reduced 500
million dollars a year.

This is the situation into which
the brain-trusters, the rubber
stamps, and the "Yes, Yes" boys
have got the financial affairs of the
United States government. The
men who advocate spending one-
self out of debt are the ones who
advocate drinking oneself sober.
In fact, these self-styled and pseudo
liberals are the real reactionaries.
They are the forces which are sell-
ing the American people into
economic slavery.

Always they proclaim that next
year, as a result of government
spending, the income of the country
is to be increased 20 to 30 per cent.
In the meantime, while they spend,
elect and experiment, the army of
unemployed mills about the streets
of our cities and towns as it has
done for the past 10 years. In the
meantime, agriculture has known
few periods of even remote pros-
perity.

People Fear Consequences

The man on the side lines, who
views it all, is driven to the belief
that under the guise of improving
the condition of the people, the
government is actually squandering
their substance and prolonging mis-
ery of the masses.

Obviously, this cannot go on in-
terminably. To keep on, year after
year, borrowing against the future,
and chasing the mirage of pros-
perity in a desert of reckless and
wasteful expenditure is to embrace
real disaster eventually.

The whole reckless program is
carried on in the same fashion
that Mark Anthony employed with
the Roman populace. You recall
that Mark "came to bury Caesar,
not to praise him."

Today, the same emotional build-
up is used in this country to put
over certain programs. As soon as
common sense commences to dis-
sipate the sophistry and lure of
mere words, a new emotional build-

up, interlarded with name-calling and epithets, is begun.

Last Monday night I listened to the address of President Roosevelt before the Retailers National forum. In the course of his address, the President said (I quote): "It would be bad for business to shift any further burden to consumers' taxes. . . . Remember as business men and as retailers that any further tax on consumers, like a sales tax, means that the consumers can buy fewer goods at your store."

I agree thoroughly with the position taken by the President. It would be more interesting to have the President's comment upon the effect on consumers' purchasing power when the day comes—if it ever does—when the lavish expenditures which he has constantly advocated are to be paid for, as they will be, by the consumers of the nation.

Consumers Must Pay Debt

The President feels, he says, that a consumers' tax would be very bad for business. But the President did not say that eventually it will be the consumers of this nation who are going to pay off the tremendous debt which the present administration is foisting upon many generations to come.

If additional consumers' taxes would be injurious now, they will be injurious whenever they are laid, and they will have to be laid as I shall presently prove if the debt is not to be repudiated, directly or indirectly.

Now bear with me. Out of the \$5,520,000,000 which the budget bureau estimates will be the total tax in-

come for the United States in 1939, all of the corporations and all of the income tax payers of the nation will pay \$2,086,000,000. How is the remaining \$3,434,000,000 raised?

It is raised now, and always has been raised by taxes on the masses of the people, the consumers of the nation. And keep in mind that while the masses of the people—the consumers—are now paying over 60 per cent of our total national tax revenue, it is not enough to make income match outgo, for at the same time we are annually spending billions of dollars more than we are taking in.

It is, of course, true that when debt payment time comes that the corporations and the income tax payers alike are going to have to pay heavy additional taxes. But even if we take every cent of income from all of the people in this nation who receive more than \$100,000 a year, it would only amount to \$974,000,000. It is obvious that the well-to-do, if we took every cent they received, could not produce the money needed to meet our present expenses or to make up the sums needed for the eventual payment of the debt. The billions to be raised annually must come out of the sweat and toil of the working masses of this nation, the white collar worker, the farmer, the laborer and the skilled mechanic.

The President's logic that consumers' taxes hurt business is sound. If this is sound and true now, it will be equally sound and true when the consumers of the United States pay, as I have shown they must pay, the additional taxes necessary to liquidate the national debt.

Of course if the President is play-

ing a hunch that prosperity has been continually present year for the last six years, does come say after that then all may be well. President's hunch should what then? It is bad policy government on hunches run it on money that generations will have order to make the nation once more.

Obviously, the policies of the present administration cannot last terminably. Indeed, to course much further is to disaster. How, then, can we flank of this movement, is sophistry? That is the task who are in positions of leadership and outside of government of getting the 120,000,000 men and children of this country on the road of real and improved conditions.

I shall attempt to prove that there is only one main, in which this can be and that is by the revival of the private business of the nation.

All Industry Includes

By business, I mean mining, electric light, gas, manufacturing, transportation, education, trade, finance, service, miscellaneous enterprises.

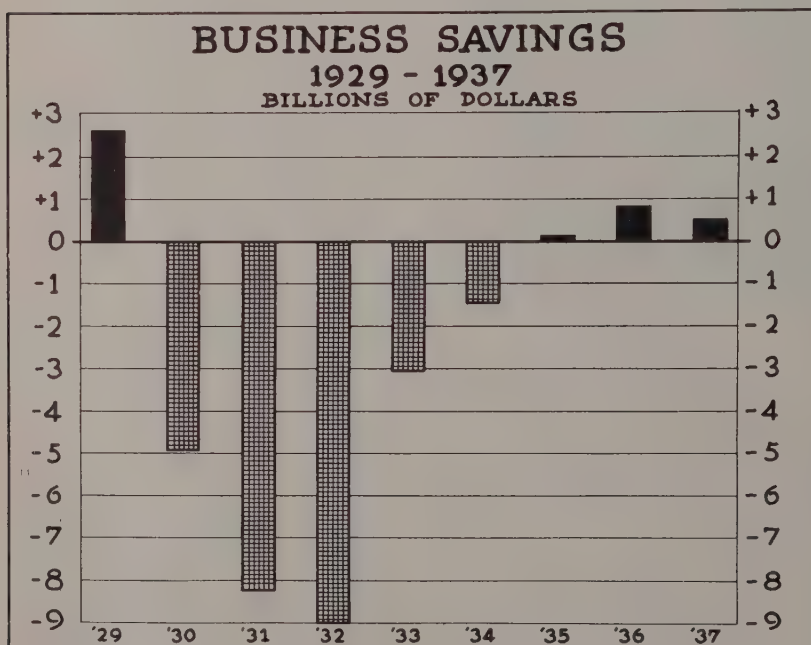
In normal times, 50,000,000 sons find employment in one or other of these activities. Some 10 to 12 million of them are normally employed are working or only partially employed.

How, then, can the national business be started so that a large part of the army unemployed can be absorbed in day work, so that tax on governmental expenditures decreased, and through exchange of goods and services can again know a normal life this nation?

First, I am of the opinion that much of the half-baked policy some of which has been such as the NRA and the spend yourself out of debt similar panaceas, has had its lack of comprehension of businesses that I have no mean to the nation.

Our people have forgotten, that the only place a citizen can find work government is in some business, whether it be manufacturing or agriculture government has nothing of revenues except what

Senator Tydings illustrated dress with nine charts. They are reproduced on these pages seven were not available for publication when this issue of the press.



duct of private business unless business can be maintained, unemployment, but annual deficits and a national debt are inevitable.

gent, the people of this country, particularly the working class, appreciate fully how we are at stake in the result. Until they do, bad business, needless experimentation and, and evil times, are inevitable.

which you see on the record compared during the administration of Franklin D. Roosevelt are not my figures. They are the figures of the department of the United States government.

part (see page 16) is Business Savings from 1929 to 1935, a nine-year period.

Tops Income

th every business in the country, including agriculture. Look at the record. In the year 1929, the United States took \$1,000,000,000 more than it paid out.

the businesses of the United States paid out five billion dollars more than the businesses of the United States took in.

all the businesses paid out \$1,000,000,000 more than they took in.

the businesses of the United States paid out \$1,000,000,000 more than they took in.

Address Reprinted

Reprints of Senator Tydings' address before the forty-eighth annual meeting of the American Iron and Steel institute, reproduced on these pages, are available to STEEL'S readers at the following prices: Single copies or in small lots, 10 cents each; in lots of 100, 5 cents each

nation paid out \$8,942,000,000 more than they took in.

In 1933, all the businesses of the nation paid out \$3,094,000,000 more than they took in.

In 1934, all the businesses of the nation paid out \$1,429,000,000 more than they took in.

And in 1935, for the first time in a five-year period, all the businesses of the nation took in \$310,000,000 more than all the businesses of the nation paid out.

Lived on Resources

The startling summation shows that from Jan. 1, 1929, down to and including Dec. 31, 1935, all the businesses paid out \$23,529,000,000 more than was taken in.

Business, during the years from 1930 to 1934 inclusive, was living

upon the resources it had collected and set aside in good years. During this period of time, most of these resources were used up. While it is true that in 1936 and 1937 business as a whole was able to make a small profit, it was not sufficient to replenish the resources which business itself, not government, spent during the five deep years of the depression.

Business, during the seven years 1929-35 inclusive, has spent practically the same amount of money which the federal government has spent in an effort to overcome and survive the depression, for business has used up \$23,529,000,000 of its accumulated resources in the period I have indicated.

Workers' Stake Largest

Without these resources, built up in good years, there would have been universal bankruptcy and economic chaos in this country. It was only because business had set something aside in the sunny days that it was able to carry on through the long storms and economic rain of the five years succeeding 1929.

And yet, in the face of that contribution, high personages in government lose no opportunity to berate, belittle and attack, and sometimes to persecute men who have carried on through the depression at a greater loss of resources than the national government has experienced.

The man who preaches to the

American Iron and Steel Institute Members at Annual Dinner



But a careful examination of all these facts, made under this

In sum, who has a larger stake

Government Prepared

What I have heretofore

(Please turn to Page

Reciprocity Is Denounced at Triple Mill Supply Convention

MONARCH OF BERMUDA, "garden isle," represented mill supply houses and held their thirty-"triple" convention. Included American Machinery Manufacturing, National Supply Distributors' association, Southern Supply and Manufacturers' association.

passengers who sailed New York May 25 and returned. It meant more than a family outing. It was a family outing in the vacation spirit. Washington was not there. There was little reference to general business outside of distribution. The speakers want to know how business may be made more profitable for buyers, to attract a larger volume of business. How floats directly between producers and manufac-

the first general meeting May 26, W. A. Purvis, president of the American Screw Corp., Hartington, commented on "the strained relations" between producers and distributors.

Potential Market

Alvin Smith-Courtney Co., a veteran secretary of the Southern association, commented on this amount and "peanuts," and urged to do a more aggressive selling job.

Barclay, editor, *Mill Supply*, New York, read a paper on "Potential in American Reciprocity Program," in which he estimated that of two billion dollars budgeted by the distributors' potential could be about 4½ per cent, or \$90 million. He expressed the

opinion that the great national defense program "may have turned the tide" in favor of new industrial plant construction.

The remainder of this meeting was devoted mainly to papers and comments on direct mail campaigns as an auxiliary in sales promotion.

In the afternoon the three associations held separate meetings.

In a brief review of "Developments in Washington," George A. Fernley, Philadelphia, advisory secretary to the National association, said:

Defends Trade Commission

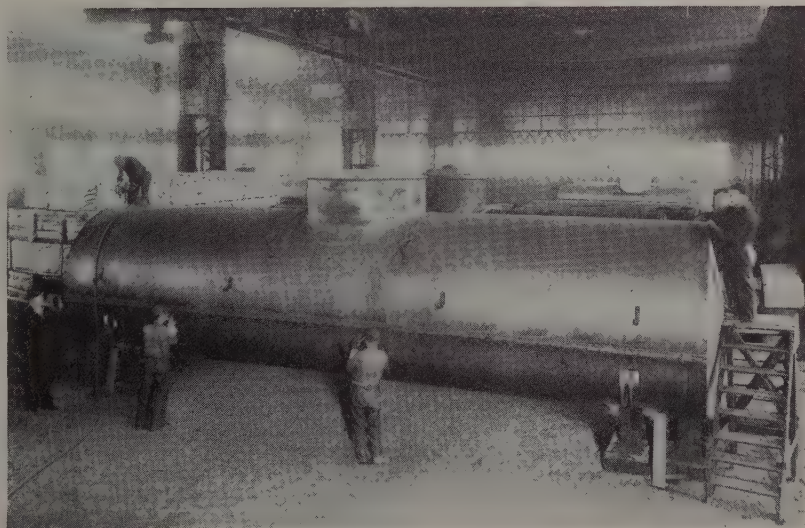
"It will take the federal trade commission many years to eliminate the practices prohibited by the Robinson-Patman act. We have heard considerable comment that the act has not been effective in preventing discrimination. To be fair to the commission, I think it has had a tremendous task, and has proceeded in a conservative man-

ner. This has been due in part to a desire to establish sound legal precedent, and in part to the lack of trained personnel. Advices received recently indicate the commission feels the ground work has been laid, that some definite precedents have been established, and that it now intends to enforce the act more vigorously."

This meeting was given mainly to questions and answers, with many members offering suggestions and comment on such subjects as: What are the outstanding advantages of a bonus system (for salesmen)? Is it advisable to cost all invoices? What is more important, volume or profit?

The association took no action but referred to committee the question on which there was the most discussion and divergence of opinion, whether a manufacturer should name one "extreme" resale discount, leaving it to distributors to set up their own table of discounts,

Wide Sheets Cut Labor Costs



■ Direct labor costs are reduced 11½ per cent in a new type of tank car construction executed by General American Transportation Corp., Sharon, Pa. Feature is the use of wide sheets ranging in size from 50½ to 88½ inches. With the width of each sheet running longitudinally, welding footage is considerably less than for ring type construction. Photo, Republic Steel Corp.

or if the manufacturer should specify quantity discounts. Simplification of discount tables was urged by some speakers.

In a report to the Southern association, Mr. Smith stated:

"The question of reciprocal buying still is before us . . . It has reached the stage where it is a source of much worry and vexation to manufacturers who are being importuned by distributors to give them reciprocal business, and some distributors are changing their manufacturer accounts because manufacturers solicited for reciprocal business are declining to grant it.

"The weakening of the resale price structure and plan is deplorable, and numerous reports of a breakdown in resale prices in the secondary market on many lines previously strongly held have come to us.

"We again call your attention to the fact that distributors urge manufacturers to assist in controlling prices in the secondary market, and where resale prices legally can be introduced, it ill-befits us to be guilty of breaking down the secondary market, to the extent of selling the manufacturers' products at prices lower than they will sell them where orders come direct to them from the consuming trade.

"The Robinson-Patman act appears still to be on the statute books, but there does not seem to be any enforcement, and from rumors reaching us from time to time, it is not being very closely observed. While a good many complaints have been entered with the federal trade commission, and some rulings have been made and cease-and-desist orders applied, it seems to be evident that discrimination is going on that cannot be justified under the law.

Resale Prices Neglected

"We also find a lack of interest in the Miller-Tydings resale price bill, which it was believed would encourage distributors to urge manufacturers to enter into resale price practices in states that have fair trade laws. Manufacturers tell us that no such demands are being made upon them by distributors. When markets that have held firmly for 12 to 15 years become as demoralized as they have in the past year on a number of lines, it seems apparent that no serious efforts are being made, either by manufacturers or distributors, to see that the market is a profitable one."

Reciprocal buying was discussed at all three group meetings and a joint resolution was adopted by each association "disapproving the practice of both manufacturer and distributor engaging in reciprocity

business," outside of normal trading and servicing areas.

Before the American association, H. F. Seymour, vice president, Columbian Vise & Mfg. Co., Cleveland, and R. D. Black, sales manager, Black & Decker Co., Towson, Md., presented papers on "Resale Policies of Manufacturing; Are They Breaking Down?"

"It is my opinion that manufacturers of industrial supplies should assume a greater responsibility for the maintenance of their individual resale prices," said Mr. Seymour.

"In approaching this subject we should recognize the difference between 'maintaining' a resale price and 'policing' a resale price. We must also realize there are legal restrictions to consider. I am not relieving the distributor of his part either in maintaining or policing a manufacturer's resale price—in fact I recognize the distributor's interest as being paramount . . .

Defines Manufacturer's Duties

"It is the manufacturer's responsibility to make his own prices, and it is his responsibility to maintain them. His responsibility does not stop just because he has taken the first step of making his own price to the distributor. The second step involving the resale price is equally as important, and the entire responsibility for its maintenance is his.

"We all know of certain products the resale prices of which are never cut by any distributor in any part of the country, yet the same distributors do cut resale prices on other products. They are the same distributors, but back of different products are different manufacturers—on the one hand, those who mean what they say when they put out a resale price; and on the other hand, those who merely put out a resale price with no thought of its maintenance.

"It has been our experience that if a manufacturer has a clear-cut resale policy, is sincerely interested in having it respected by distributors, that such manufacturer can accomplish his end to a very satisfactory degree, but not absolutely. He cannot completely control his resale policies without co-operation of all his distributors . . .

"Perhaps one of the most disturbing influences in maintaining resale prices is where the local plant of a national organization secures prices from local distributors and then sends these prices to the main office, ordinarily in a large city. Then the central purchasing department starts to shop, and often finds a better price and makes the purchase, unless the purchasing agent of the local plant is successful in breaking the local distributor's price down to a point where it

equalizes the purchasing to the central office.

"Here the local distributor gets the mercy of that central office, and also at the mercy of the seller who is competing distributor in that local business of the large buyer."

Various features of buying again came in for discussion at a sales and buying "clinic" held jointly by three associations Saturday.

"It is largely a question of business morality," said Robert H. Osborn, president, Osterman Co., Cleveland. "Manufacturing is a simple job these days. The tendency is to fill the plant; sales is the thing. The tendency is to take the immediate order. We could temper that tendency with consideration for the future. We would not need such level-headed buying and selling."

"A company's reputation for business and fairness is its life. The loss of an immediate sale may be a very fine investment, but all, not many orders are sticking to principle. The heavy loss may be considerable, almost invariably they come back."

Only one session was held on the return voyage, May 31, at Channon, manager, Miller-Tydings, New York, presented results of an extensive survey of industrial buying and selling related to supply business, illustrated with stereopticon slides. An industrial research organization employed, a "sample" industry was selected, and buyers and sellers were interviewed.

Reasons for Patronizing

Among reasons given for patronizing manufacturers' houses were, in numerical order: Quick delivery; savings in holding down inventory; emergency services; local buying support; local buying most convenient; regularity with salesmen; savings in reducing order routine.

Distributor's competitive advantage goes down as size of buyer's plant goes up.

Over 70 per cent of the consuming plants gave as their reason for buying direct from manufacturers. Other reasons for not buying more liberal local distributor: Because distributor did not handle required product; distributors were not sufficiently reliable. Still others stated they buy direct for reciprocity reasons.

American Supply and Manufacturing Association has the following officers:

D. W. Northrup, Henry C. (Please turn to Page 20)

ies of Steel s Makers

FACTURERS and Fabri-
s moved its offices and
4389 Martin avenue,
new and larger quar-
O., where it has leased
former Columbia Steel
ditional machine tools
stalled. In addition to
en welded steel fabrica-
pany will manufacture
tubing in sizes from 1
n diameter.

Iron & Steel Co., Phila-
removed its main offices
at Tacony and Lewis

& Supply Co., Clevel-
opened an office at 404
ing, Pittsburgh. S. W.
istrict manager, and H. J.
ant manager.

Molded Plastics, a divi-
Rnolds Spring Co., Jack-
has established a sales
Hanna building, Clevel-
Robert R. Wilson in

g Engineering Co. Inc.,
ed City, N. Y., has con-
s general offices, plant
use in new quarters at
first avenue, Long Is-

mersville Blower Corp.,
Ind., has moved its
ice from room 814, 140
rborn street, to room
eles Gas building, 122
igan avenue. Personnel
ed.

ent Pneumatic Tool Co.,
s opened a branch office
adway, Denver, in charge
rnquist. The new branch
to render complete sales
on the company's lines
and contractors equip-
portable electric and pneu-

Corp., 229 First street,
has been formed to ex-
v process of manufactur-
for die castings, plastics,
d porcelain molding. L.
consulting engineer and
with the Owens-Illinois
and P. A. Bleakley, vice
are executives of the new
Costs of the new process
is down to about 10 per
pense of older methods,
ted.

District Steel Rates

	Percentage of Ingot Capacity Engaged In Leading Districts			
	Week ended June 3	Change	Same week 1938	1937
Pittsburgh ...	42	+ 6	18	95
Chicago	53.5	+ 4.5	22.5	63
Eastern Pa. ...	37	None	26	71
Youngstown..	48	+ 3	21	29
Wheeling	70	+11	38	96
Cleveland	53	- 1	31	46
Buffalo	44	+ 2	21	88
Birmingham .	60	+ 3	69	83
New England..	35	-10	27	45
Cincinnati ...	60	+ 8	22	96
St. Louis	37.5	- 1.5	39.3	91
Detroit	57	None	18	100
Average.....	52	+ 4	25.5	75

Steel Institute Takes Over Research Work

■ Research in steel technology formerly conducted by the Association of American Steel Manufacturers technical committees, Pittsburgh, has been transferred to technical committees of American Iron and Steel institute, effective June 1, it is announced by the association and the institute. Offices of the association have been closed after 40 years' activity.

Standards for chemical compositions, physical properties, rolling tolerances and other permissible variations from specified dimensions originally promulgated by the Association of American Steel Manufacturers technical committees will hereafter be sponsored by the Steel institute, and published as part of its "Steel Products Manual."

700 Veteran Employees Honored at Cleveland

■ Cleveland employers last week honored 700 of their workers who had served 40 years or more. Representing 130 firms, the veterans received bronze medals at a dinner sponsored by Cleveland's chamber of commerce.

Featured speaker was John A. Stephens, industrial relations director of United States Steel Corp., Pittsburgh. Outlining changes in American industrial life in the past four decades, he declared all enterprise seems to be heading toward management by "consultation" rather than by "dictation."

Companies with the largest number of veterans present included the New York Central, Erie and Pennsylvania railroads, and American Steel & Wire Co. A silver plaque went to Alfred B. Bower for 61 years' service with Lamson & Sessions' Co., "longest record of uninterrupted employment in Cleveland industry."

PRODUCTION

■ **STEELWORKS** operations last week rose 4 points to 52 per cent, highest since mid-April. Advances were made in seven districts, and declines in three, while two remained unchanged. A year ago the rate was 25.5 per cent; two years ago 75 per cent.

Youngstown, O.—Gained 3 points to 48 per cent, due to increase in bessemer production. Schedule this week probably will show increase to 50 per cent with 44 open hearths in production.

Cleveland—Declined 1 point to 53 per cent, an increase by one interest being offset by the shutting down of two furnaces by another mill for repairs.

Birmingham, Ala.—Up 3 points to 60 per cent.

Pittsburgh—Increases by several mills brought an advance of 6 points to 42 per cent.

Wheeling—Heavier production by all interests moved the rate up 11 points to 70 per cent.

Cincinnati—Advance of 8 points to 60 per cent, highest since January. One interest is accumulating ingots to allow shutdown in July for plant improvements.

Buffalo—Rose 2 points to 44 per cent, one open hearth being added.

New England—Down 10 points to 35 per cent.

Central eastern seaboard—Unchanged at 37 per cent for the fourth week. Ingot stocks are low at most plants, with May business 20 per cent above April for some producers.

St. Louis—Loss of 1.5 points resulted from substitution of smaller furnaces, making the rate 37.5 per cent.

Chicago—Gain of 4.5 points to 53.5 per cent resulted from two interests increasing production sharply.

Detroit—Steady at 57 per cent with program for this week showing little change.

Revere Copper Honors 50 Years' Service

■ Sterling silver plaque recently presented by Revere Copper & Brass Inc. to employe Clarence S. Parker recognized completion of his fiftieth year of service. Award was made by F. J. Carroll, production manager, at a dinner of the Revere Copper & Brass Foremen's association.

Now in an advisory capacity at Revere's Taunton, Mass., plant, Mr. Parker began his service on May 1, 1889, as assistant to the foreman in the cast shop and yellow metal mill at Taunton. He became superintendent of the Taunton and New Bedford, Mass., plants in 1920.

Predict 1939 Will Establish New Peace-Time High in Shipbuilding

■ SHIPBUILDING awards, registering a gain for the fourth consecutive year, will attain a peace-time record in 1939, it is predicted in shipping circles.

Supporting this contention is the recently signed 1940 naval appropriation bill, providing funds for 24 vessels, some of which will be placed this year. Apart from a swelling volume of miscellaneous ship work, a total of possibly 50 merchant ships will be awarded by the federal maritime commission.

Bids recently were opened on four submarines and four destroyers, while the maritime commission is expected to take bids soon for 12 C-1 8000-ton merchant ships. The eight naval vessels are included in the 1940 appropriation bill. Also provided are four additional submarines, four additional destroyers, two 45,000-ton battleships, two 8000-ton cruisers and four auxiliary ships. It is estimated this program will require more than 40,000 tons of steel.

Already this year the maritime commission has placed 14 C-3 merchant ships, six going to Newport News Shipbuilding & Dry Dock Co., Newport News, Va., four to Sun Shipbuilding & Dry Dock Co., Chester, Pa., and four to Ingalls Iron Works, Birmingham, Ala.

Among other major contracts

booked by private yards: Tanker for the Texas Co., Sun Shipbuilding; four 6000-ton light cruisers, two by Bethlehem Steel Co., Quincy, Mass., two by Federal Shipbuilding & Dry Dock Co., Kearny, N. J.; and one 20,000-ton aircraft carrier, Newport News Shipbuilding.

Work placed in navy yards during 1939 has been featured by award of a 35,000-ton battleship to the Norfolk, Va., yard, and one 6000-ton mine layer to the Philadelphia yard.

It is estimated steel entering ship construction this year will total at least 350,000 tons. This would compare with 308,451 tons last year and 320,460 tons in 1937, according to STEEL's annual distribution figures, as shown in the following table:

Year	Tons of Steel For Ships, Repairs	Total Finished Steel Consumed	Percentage Consumed By Ships
1938	308,451	18,692,957	1.65
1937	320,460	32,695,349	0.98
1936	231,644	29,072,596	0.80
1935	156,890	20,819,710	0.75
1934	154,832	15,870,696	0.98
1933	89,344	13,743,121	0.65
1932	79,650	9,317,974	0.86
1931	179,181	17,396,997	1.03
1930	308,491	25,769,914	1.20
1929	296,554	36,157,095	0.82
1928	150,352	28,537,621	0.53

While the volume of ship work placed last year was greater than in 1937, the actual quantity of steel consumed was approximately 12,000 tons less. This is accounted for by the lag between placing of ships

and consumption of the steel.

Heavy peace-time building in 1929 and 1930, as shown in the foregoing table, was largely due to the maritime commission's successor, the shipping board. In the 20's promoted considerable construction in connection with renewal of mail contracts. The maritime commission's calls for subsidies to American lines, based on differential building and operating costs as compared with competitive costs abroad.

It is believed the peak in steel consumption in connection with present shipbuilding program will not come until 1940 or 1941, when of the vessels now on order for naval and commercial, will be placed until late in 1938 and 1939. However, requirements of allied industries which furnish materials and build equipment for vessels are expected to be high soon.

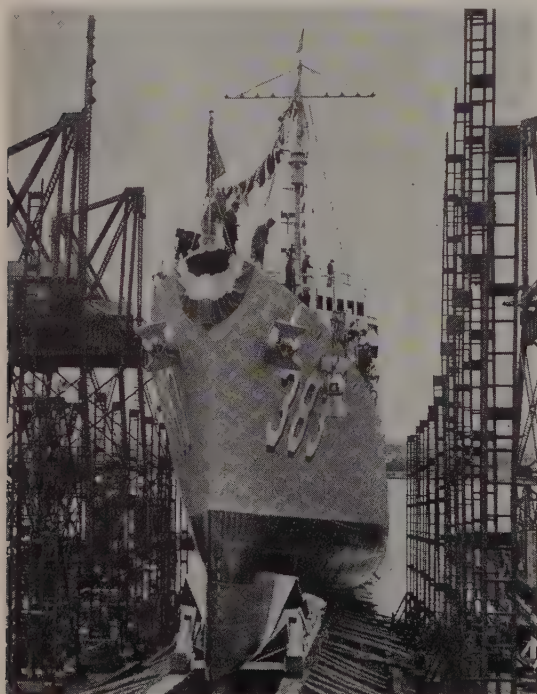
This country's rapid growth in merchant ship construction, which has her the world's second largest fleet, is reflected in figures published by Lloyd's Register for the first quarter of 1939. On March 31, 1939, the order book totaled 420,931 gross tons, or 10 per cent more than the 382,000 tons on Dec. 31, 1938. Great Britain, No. 1 builder, on March 31, 1939, had 903 gross tons on order, against 762 tons Dec. 31, a decline of 15 per cent.

Designing Faster Vessels

Trend in commercial shipbuilding is toward higher speeds, according to H. Gerrish Smith, president of the National Council of American Shipbuilders, New York, is toward higher speeds, greater capacity, higher ratio of cubic capacity to displacement, and higher pressure hulls, and higher temperatures in machinery design.

Now under consideration are high-speed tankers, similar to those being built for Standard Oil of New Jersey and the navy. But these are not likely to become active for some time. Plans and specifications for three cargo ships for the Seaport Co. have been completed. George C. Sharp, naval architect, New York, and bids on them may be asked through the time commission.

Other private companies building programs include the United States Line, three or four for its New York-London service; Mississippi Shipping Co., three senger-cargo boats for its Gulf of Mexico run; New York & Mail Steamship Co., a passenger ship and three cargo boats; Bros. Steamship Co., five cargo vessels; and South Atlantic Steamship Co., five cargo vessels.



Navy Ship Down the Ways

■ Fighting craft for Uncle Sam are prominent in shipyards today humming with record peace-time activity. Shown launching at Kearny, N. J., yard of Federal Shipbuilding & Drydock Co. is a modern destroyer. NEA photo

Pig Iron Production Down Per Cent; Five Stacks Added

ION of coke pig iron States in May showed reduced operations occurred the prospective coal average daily output was 13,138 tons, or less than the April of 68,511 tons, despite of five active stacks in May.

duction during May was 13,138 tons, a decrease of 16.5 per cent, compared with April total of 2,055,326 tons, the lowest since September 1, 1937, when 1,683,097 tons were produced. In May, a year ago, total production was 1,260,937 tons.

In the first five months this year, production totaled 10,400,731 tons, an increase of 530,380 tons, or 51.4 per cent, compared with the 6,870,351 tons produced in the like period of 1938.

IRON PRODUCTION

Gross Tons		
1939	1938	1937
75,423	1,444,862	3,219,741
160,183	1,306,333	3,020,006
193,255	1,470,211	3,470,470
55,326	1,388,008	3,400,636
16,544	1,260,937	3,545,180
100,731	6,870,351	16,656,033
.....	1,060,747	3,115,302
.....	1,213,076	3,501,359
.....	1,495,514	3,616,954
.....	1,683,097	3,417,960
.....	2,067,499	2,891,026
.....	2,286,661	2,007,031
.....	2,212,718	1,503,474
.....	18,889,663	36,709,139

the like period of 1938. In the first five months of 1937 production was 6,033 tons.

production to capacity, in May averaged 40.3 per cent, compared with 50 per cent in April and 56 per cent in March. In August, 1937, production was lowest since August, 1937, when 1,683,097 tons were produced. In May, a year ago, total production was 1,260,937 tons. In the first five months this year, production totaled 10,400,731 tons, an increase of 530,380 tons, or 51.4 per cent, compared with the 6,870,351 tons produced in the like period of 1938.

blown in during May in Alabama: Ensley Nos. 1 and 2; Tennessee Coal, Iron & American Co.; and in Maryland: Maryland

"A," Bethlehem Steel Co. In Michigan: One Detroit, National Steel Corp. In Ohio: Hubbard, O. No. 1, Youngstown Sheet & Tube Co. In Pennsylvania: One Donora, American Steel & Wire Co.; Bethlehem Steel Co.; and Cambria "L," Bethlehem Steel Co.; Duquesne No. 4 and Ed-

AVERAGE DAILY PRODUCTION

Gross Tons				
	1939	1938	1937	1936
Jan.	70,175	46,608	103,863	65,461
Feb.	73,578	46,655	107,857	63,411
March	77,201	47,426	111,951	66,004
April	68,511	46,267	113,354	80,316
May	55,373	40,675	114,360	85,795
June ....	.....	35,358	103,843	86,551
July ....	.....	39,131	112,947	83,735
Aug. ....	.....	48,242	116,676	87,475
Sept. ....	.....	56,103	113,932	90,942
Oct. ....	.....	66,694	93,259	96,509
Nov. ....	.....	76,222	66,901	98,331
Dec. ....	.....	71,378	48,499	100,813
Ave.	68,905	51,752	100,573	83,832

gar Thomson "D," Carnegie-Illinois Steel Corp.

Stacks blown out or banked were: In Alabama: Pioneer No. 1, Republic Steel Corp. In Ohio: Lorain No. 4, National Tube Co.; one Canton, Republic Steel Corp. In Pennsylvania: Bethlehem "G," Bethlehem Steel Co.; Mononghela No. 2, National Tube Co.

Steel Industry Payrolls, Employment Off in April

Reflecting the drop in steel production between March and April, employment and payrolls of the

steel industry during April were below the March figures, according to the American Iron and Steel institute.

A total of 452,000 employees were at work during April, less than 1 per cent below the March figure of 455,000. By comparison, steel ingot output in April was 12 per cent below March.

April payrolls totaled \$58,517,000, a decline of 9 per cent from March payrolls of \$64,174,000.

Wage-earning employees earned an average of 82.9 cents per hour in April, against 82.8 cents in March and 82.6 cents in April last year. Number of hours worked per week by wage earners averaged 32.1 in April, compared with 34.7 in March and 25.6 in April 1938.

Steel for Household Goods Down in 1938

Consumers' purchases of nearly 3,863,000 refrigerators, kitchen ranges and electric washing ma-

MAY IRON PRODUCTION

	No. in blast last day of May Apr.		Total tonnage Merchant Non-merchant	
Alabama	12	11	59,720	97,613
Illinois	7	7	43,916	101,028
New York	7	7	8,192	115,820
Ohio	23	24	41,919	321,650*
Penna.	33	30	26,876*	423,167*
Colorado	2	2	6,242*	335,875
Indiana	8	8		
Maryland	5	4		
Virginia	1	1		
Kentucky	1	1	0	134,526
Mass.	0	0		
Michigan	4	3		
Minnesota	1	1		
Missouri	0	0	0	134,526
Tenn.	0	0		
Utah	1	1		
West Va.	2	2		

Total. 107 102 186,865* 1,529,679*

*Includes ferromanganese and spiegel- Eisen.

RATE OF OPERATION (Relation of Production to Capacity)

	1939 ¹	1938 ²	1937 ³	1936 ⁴
Jan.	51.0	33.6	76.6	48.2
Feb.	53.5	33.6	79.5	46.4
March	56.1	34.2	82.5	48.5
April	49.8	33.4	83.7	59.1
May	40.3	29.4	84.3	63.1
June ....	.....	25.5	76.6	63.6
July ....	.....	28.2	82.9	61.5
Aug. ....	.....	34.8	85.7	64.3
Sept. ....	.....	40.5	83.7	66.9
Oct. ....	.....	48.0	68.4	71.0
Nov. ....	.....	55.0	49.3	72.3
Dec. ....	.....	51.4	35.6	74.2

¹ Based on capacity of 50,198,920 gross tons, Dec. 31, 1938; ² capacity of 50,606,400 gross tons, Dec. 31, 1937; ³ first half on capacity of 49,512,737 tons, Dec. 31, 1936 —second half on capacity of 49,727,737 tons, June 30, 1937; ⁴ capacity of 49,777,893 tons, Dec. 31, 1935. Capacities by American Iron and Steel institute.

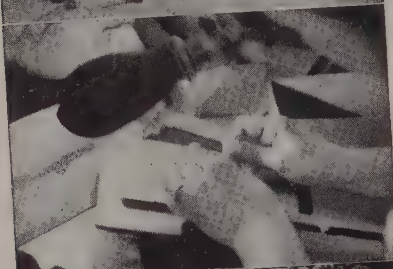
chines represented a market for approximately 260,000 gross tons of steel during 1938, estimates the American Iron and Steel institute.

The sharp reduction from the record total of 6,691,000 units sold in 1937, which represented a market for 461,000 tons of steel, coincided almost exactly with the rate of decline in total tonnage of steel produced between 1937 and 1938.

Approximately 121,000 gross tons of steel were used in manufacturing 1,425,000 gas and electric refrigerators last year. Steel for 1,300,000 gas and electric ranges totaled approximately 110,000 gross tons. Approximately 29,000 tons were used in 1,138,000 washing machines.

HUMAN FINGERS

MECHANICAL HANDS



It takes a happy
combination of both
to fabricate

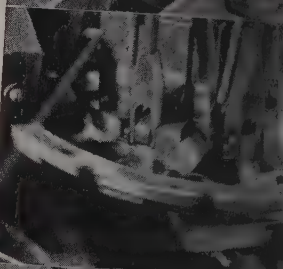
Barnes-made Springs

Skilled hands are matched
by machines equally facile
in their adaptability to the
amazing twists and turns in
spring manufacture. Just
what this means to you as a
user of springs may best be
expressed in terms of:

QUALITY

PRICE

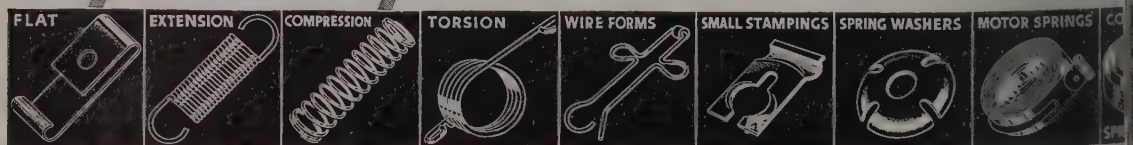
DELIVERY



*All three considered, you'll find that
Barnes-made Springs are the economical buy.*

Springs

THE WALLACE BARNES
DIVISION OF ASSOCIATED SPRING CORP.
BRISTOL • CONNECTICUT



SPRINGMAKERS FOR MORE THAN THREE QUARTERS OF A CENTURY

Windows of WASHINGTON



M. LAMM
 on Editor, STEEL

WASHINGTON
IMPORTANT matter at
 capital last week was
 ation on which the
 and means committee
 ing hearings. Consid-
 nce of thought exists
 ers of both houses as
 ax situation should be
 ere is unanimity of
 ver, that present nuis-
 which expire June 30
 net the government
 billion dollars a year,
 ewed.

known, secretary of the
 argenthau and Under-
 n W. Hanes have both
 or of revamping the
 are claimed to be a
 better business.

before the ways and
 ittee last week, Secre-
 thau suggested — but
 commend"—provision in
 laws to permit business
 its net losses in one
 deducted from business
 ure years be one of the
 en under consideration.

Drop Profits Tax

repeal or lapsing of the
 profits tax which has
 to as a deterrent. An-
 which he thought the
 ould take up is repeal
 al stock tax and the re-
 profits tax and also
 o make it impossible in
 o issue tax-exempt se-
 here is much contro-
 is last point, and sug-
 been made that this be
 om the regular tax leg-

Morgenthau told the
 n some detail of plans
 nges which have been
 by his department and
 n with some immediate
 suggested a provision
 ge study of the whole
 ation which would be
 by the senate finance

committee, the house ways and
 means committee and the appropri-
 ation committees of both houses of
 congress.

He pointed out that the budget
 act originally set up procedure for
 a unified budget, but no such com-
 parable procedure was accomplished
 in the budget act by congress for
 revenues and expenditures.

Apparent agreement on the tax
 situation has been reached by the
 congressional leaders and the White
 House. The one thing the Presi-
 dent is insisting upon, however, is
 that the amount of taxes to be col-
 lected by the government under any
 new tax bill will equal those which
 are now being received. Also the
 President has insisted that the tax
 burden should not be shifted from
 one class of tax payers to another,
 by which he apparently has in mind
 that taxation on large corporations
 shall not be cut so that smaller cor-
 porations will have to pay increased
 taxes.

Among tax problems which con-
 front the treasury, Secretary Mor-
 genthau pointed out is the limita-
 tion now placed on the deduction on
 capital loss. Under the present
 law, an excess of corporate capital
 losses over capital gains can be de-
 ducted from ordinary income only
 to the extent of \$2000. This is one
 category of tax problems which
 raises the question of tax equity,
 he said, and suggested it as the sub-
 ject of further study on the ground
 that hasty tax revision might mean
 the loss of revenue. The Morgen-
 thau statement made to the com-
 mittee had the approval of the Pres-
 ident, it is reported.

NLRB TO CHANGE RULES TO AID EMPLOYERS

J. Warren Madden, chairman of
 the national labor relations board,
 told the house committee on labor at
 a hearing last week that the board
 will amend its regulations shortly to
 give employers the right to ask for
 collective bargaining election under

some circumstances. Madden told
 the house committee that the board
 has the power to permit such pro-
 cedure but without safeguards "it
 would do no good and would do
 much harm."

Members of the house committee
 questioned Madden as to why his
 board hadn't taken this action be-
 fore in order to stamp out the criti-
 cism.

In answer Madden said: "I haven't
 the slightest doubt the board will
 make a change in that direction, but
 as long as the hearings are going
 on we thought we should get the
 benefit of the testimony of witnesses
 and the advice of you congressmen
 as to what you think would be de-
 sirable."

HULL WOULD HAVE ARMS EMBARGO ELIMINATED

Neutrality question is causing con-
 siderable controversy and there are
 indications that the house and sen-
 ate do not feel the same about the
 neutrality law.

Secretary of State Hull last week
 sent a communication to the chair-
 man of the senate foreign relations
 committee and the house commit-
 tee on foreign affairs which sets
 forth for the first time the admin-
 istration's policy on this subject.

Among other things Secretary
 Hull recommended continuation of
 the national munitions control board
 and the present system of arms ex-
 port and import licenses. He rec-
 ommended also continuing existing
 legislation respecting loans and
 credits to nations at war and the
 provision that the export of goods
 destined for belligerents shall be
 preceded by transfer of title to the
 foreign purchaser.

"It is my firm conviction," said the
 secretary, "that the arms embargo
 provision of the existing law should
 be eliminated." Mr. Hull further
 recommended that provisions be en-
 acted into a new neutrality law to
 prohibit American ships, irrespec-

tive of what they might be carrying, from entering combat areas and restriction of travel of American citizens in combat areas. Also a provision to regulate the collection of funds for belligerents.

"Provisions along suggested lines would, I think," Secretary Hull said, "help to keep this country out of war and facilitate our adherence to a position of neutrality. They would make easier our two-fold task of keeping this country at peace and avoiding imposition of unnecessary and abnormal burdens upon our citizens."

Discussing the embargo situation further, the secretary said:

"If we go in for embargoes on exports, for the purpose of keeping ourselves out of war, the logical thing to do would be to make our embargo all-inclusive. Modern warfare is no longer warfare between armed forces only; it is warfare between nations in every phase of their national life. Lists of contraband are no longer limited to arms and ammunition and closely related commodities. They include not only those items which contribute toward making warfare possible, but almost every item useful in the life of the enemy nation.

"A nation at war is no less anxious to keep cotton or petroleum, or, indeed, any useful product, from reaching an enemy nation than it is to keep guns and airplanes from reaching the enemy's armed forces. I doubt whether we can help ourselves to keep out of war by an attempt on our part to distinguish between categories of exports. Yet a complete embargo upon all exports would obviously be ruinous to our economic life. It therefore seems clear that we should have no general and automatic embargo inflexibly and rigidly imposed on any class or group of exports."

WAGE-HOUR AMENDMENT AGREEMENT IS REACHED

An agreement has been reached between Mrs. Norton, chairman of the house committee on labor, and the agricultural bloc of the house regarding administration amendments to the wage-hour law. Under this agreement Mrs. Norton expects to bring the amendments up for action by the house June 5. The agreement specifically provides that the Norton committee will not ask for any amendments related in any way to agriculture.

A couple of weeks ago, Mrs. Norton had asked the house to vote on administration amendments to the wage-hour act but changed her plans because of the opposition of the farm bloc in the house. They strenuously objected to proposals for restricting exemption of certain

farm workers from the minimum wage provisions. Unless something unexpected develops, it is anticipated the amendments will be passed.

PRESIDENT AND BUSINESS MEN DISCUSS EMPLOYMENT

Edward R. Stettinius Jr., chairman of the board, United States Steel Corp.; Charles R. Hook, president, American Rolling Mill Co.; Charles C. Conway, chairman, Continental Can Co.; Gano Dunn, president, White Engineering Co.; and several other members of the commerce department's business advisory council had dinner at the White House Thursday night, followed by a conference with the President.

Secretary of Commerce Hopkins stated at press conference Friday that the Thursday night dinner for business executives was an attempt to get a reasonable meeting of minds between the administration and business. He said the President was interested in having further conferences either with this group or some other group of business executives.

Mr. Hopkins said the discussion ran the whole gamut of economic conditions in America dealing with the government and business. Among other matters discussed, the secretary said, was the relationship between labor, industry and the government. He said there was also discussion of a labor relations act and foreign trade with special emphasis on South America.

The business men, Mr. Hopkins said, made individual statements to the President regarding their own problems and the progress of their firms.

The dinner conference was at Hopkins' request to the President. The secretary said the business advisory council which has been meeting in Washington for the past couple of days has been working out several important confidential reports for his own use, and these, he said, will not be made public.

BILL PROVIDES LOANS FOR SMALL BUSINESS

Representative Sabath, Illinois, introduced a bill in the house last week (H. R. 6448) which has been referred to the banking and currency committee, providing for liberalization of credit to small businesses.

The bill contemplates placing into active use millions of dollars now frozen and lying idle in vaults of the banks. A paradoxical situation has arisen. Business requires additional capital, and such capital is available. Yet the medium, instrumentality or "missing link" to bring these forces into play as yet remains undevised. As justification

for the refusal to extend banks blame unnecessary restrictions to which they are subjected. It is the purpose of the proposed act to alleviate this. To keep the wheels of banking, sufficient credit to reputable business men standing must be established.

Some of the salient points of the proposed bill provide:

An instrument in the form of a trade acceptance certificate, when accepted by a bank, is eligible for discount through reserve banks or through any other institution to be established by the President's recent "first government reorganization act" as co-ordinator of lending agencies. The acceptance certificates are issued by a trustee designated by the President, on conditions directly related to buying, selling, manufacturing or producing goods.

STRATEGIC MINERAL RESOURCES PRACTICALLY ASSURED

The house has adopted a conference report on strategic minerals providing for expenditure of \$100,000,000 in four years. The report now will be adopted by the senate and sent to the White House for signature.

Pennsylvania Legislature Outlaw Sitdown Strikes

■ Pennsylvania's legislature last week passed a bill to outlaw sitdown strikes and other labor union activities. The bill drastically revises the state "Wagner act" passed during the preceding administration.

Similar curbs on illegal activities have been enacted by other states during the past year (May 15, p. 23).

The Pennsylvania act prohibits an unfair labor practice by an employer, union, or union official to intimidate, restrain or coerce an employee by threats of force, violence, or harm with the intent of compelling the employee to join a labor organization; any employer with intent of compelling the employee to accept demands, conditions or terms of employment.

The act would require the board to respect craft unions to decide for themselves the issue of who should be elected as representative; and to limit the board's power to invalidate contracts between employer and employee.

Measure also permits a laborer to petition the state labor board for a collective bargaining election.

BUYING SPURRED AIR TRAFFIC

ns in air travel are steadily growing demand for transport equipment, it builders.

with the poor show-
ortation in general
airline passengers in-
cent to 1,536,111;
flown were up 5 per
127; and air express
000 pounds, up 5.22
ding carriers report
nth was best in his-

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on the United States
ives this country a
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having allotted four
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expected to require
nes.

ircraft Co. Inc. has
to American Airlines
passenger craft. This
is 53 Douglas units.
ntly turned over to
es for testing its
ine, the 42-passenger
d at cost of \$2,000,000.
ates ordering seven

such ships, while options are held by four other lines. Royal Dutch Airlines is interested in purchasing six.

United soon will remove its operating base from Cheyenne, Wyo., to Oakland, Calif., building new maintenance shops, power house and machine shop at cost of \$500,000, including equipment.

Newly-formed at Modesto, Calif., Transair Inc. plans to manufacture tri-motored transports. Company will finance a new plant with 600,000 shares of common stock.

Harvill Aircraft Die Casting Corp., Los Angeles, is issuing additional common stock, will buy machinery and equipment for producing aeronautical die-castings.

Federal Orders Allotted

Government aeronautical orders placed last week: For the army air corps, Curtiss Propeller division of Curtiss-Wright Corp., Clifton, N. J., hub and booster assemblies, \$94,627; Breeze Corporations Inc., Newark, N. J., fuel indicators, \$58,500; and Weston Electrical Instrument Corp., Newark, N. J., indicators, \$37,968; for the navy, Wright Aeronautical Corp., Paterson, N. J., engine parts, \$58,250.

Six hydraulic presses of the double-action, electrical-drive type were recently delivered to airplane makers by Baldwin-Southwark Corp., Eddystone, Pa. Three have 2050-ton capacity, three 280-ton.

MEETINGS

HERBERT HOOVER TO MAKE ENGINEERS' DAY ADDRESS

■ NATIONAL semiannual meeting of the American Society of Mechanical Engineers at the Fairmont hotel, San Francisco, July 10-15, will be keyed to the theme "greater service to science, industry and humanity." In connection with this meeting, Golden Gate International exposition has designated July 13 as Engineers' Day, the main feature of which will be an address by Former President Herbert Hoover, an honorary member of the A. S. M. E., on the contributions which engineering has made to human welfare.

The San Francisco meeting schedules 14 technical sessions sponsored by the aeronautic, fuel, hydraulic, heat transfer, power, management, process industries, oil and gas power, and materials handling divisions. Dr. Rodolfo E. Ballester, engineer and director, irrigation department of Argentina, South America, will present the fifth Calvin W. Rice lecture. He will discuss hydraulics and how American engineers may better co-operate with those of South America.

ELECTRICAL ENGINEERS TO MEET ON PACIFIC COAST

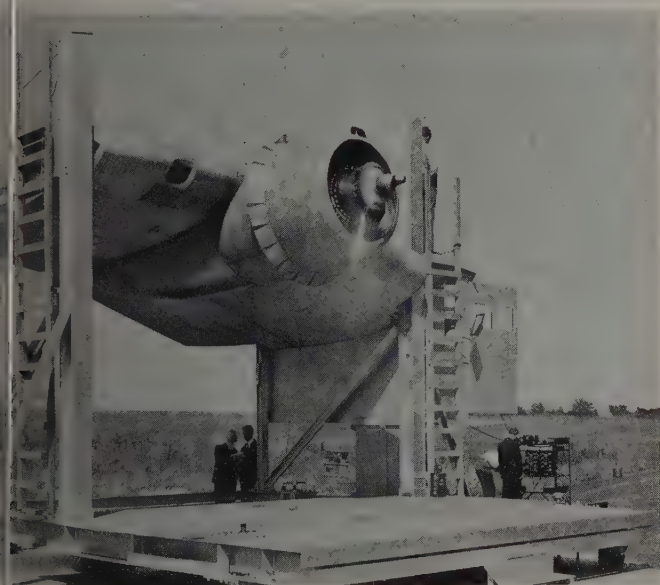
American Institute of Electrical Engineers will conduct its summer and Pacific Coast convention at the Fairmont hotel, San Francisco, June 26-30. At the opening session, F. M. Farmer, vice president, Electrical Testing Laboratories, New York, will be inducted into office as president. Marion A. Savage, designing engineer, General Electric Co., Schenectady, N. Y., will receive the Lamme medal "for able and original work in development and improvement of mechanical construction and efficiency of large high-speed turbine alternators."

World Tin Production At Five-Year Low

■ March world tin production is estimated at 7500 gross tons, lowest figure for more than five years. This brings first quarter output to 33,400 tons, a decrease of 23 per cent from first quarter, 1938, according to International Tin Research and Development council, The Hague.

World apparent tin consumption in March was 13,400 tons; for first quarter 35,700 tons, a decrease of 13 per cent from first quarter last year. World tin plate production in first quarter amounted to 950,000 tons, an increase of 24 per cent over 766,000 tons made in first quarter, 1938.

Ground-Testing New Power Plant



models are ground-tested at Glenn L. Martin Co.'s Middle River, this special rig. Mounted over a turntable in mock-up nacelle and the engine is operated four weeks under varying conditions. Ob-
lcony" check and record its performance. The equipment is said
to reduce test-flying time as much as 50 per cent

AT CURTISS WRIGHT

WHERE "SPLIT DEGREES" OF ACCURACY ARE DEM

● In plants of widely recognized manufacturers where standards of work specifications are held to "Split-degrees" of Accuracy, Bullard Multi-Au-Matics have gained a reputation as key manufacturing units.

These machines with independent individual feeds and speeds at each station—operations of rough turning, boring, drilling, finishing, reaming, and threading—simultaneously provide a finished piece in the time of the longest operation, plus a few seconds for indexing. Furthermore, double indexing provides for first and second chucking of work on the same machine.

If others make real profits with Multi-Au-Matics, why not You, too? Let Bullard Engineers tell how it can be done on your work.



THE BULLARD COMPANY
BRIDGEPORT, CONNECTICUT

Mirrors of



A. H. ALLEN
 bit Editor, STEEL

MOTORDOM

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ONWISE, last week te dud in the motor combination of a holi-shutdowns at Chrys- (ept Dodge Truck) and nsion of assemblies by ing to slash total car he lowest point of the

settlement of the e, which is costing ble workers an esti- 0 daily in wages, ap- e, although no particu- was being brought on factions for an early atter was thrown in eral conciliator James o, privately, was re- nistic over likelihood djustment. Both sides l they would abide by sion Dewey reached, no searching analysis e UAW-CIO group will from its position and ne of the militancy aracterized its actions t of the strike.

for Dominance

affair is nothing more y of strength by the hich is sparing no e campaign to demon- nance of automotive nts of Homer Martin, d of the UAW, have little minor sniping at group, one foray the at a Briggs plant on ad resulting in several s, one wounded com- several bruised. How- seems to be fighting e and unless he can y tieup with the AFL e over around Detroit. s have emanated from rters for a speedy re- body operations at hich Chrysler is de- probably for two rea-

sons. One is that Chrysler is faced with a rather delicate labor situa- tion itself and any pressure on Briggs might only bring out dis- turbances at Chrysler next. The other is that dealers generally are well fixed on supplies of new cars and beyond occasional instances where shortages have occurred, are not pressing for shipments.

The most unfortunate aspect of the trouble has been the suspension of activity in Briggs die departments which were working overtime on re-

quirements for 1940 models. The two weeks delay already incurred conceivably may force some readjust- ment of new model introductions, but is not likely to have an immedi- ate effect on the customary round of sales conferences and other pre- liminaries which precede the intro- duction of new cars. The only effect will be on production dates which have been established on the vari- ous Chrysler lines.

Some diemakers at Briggs, seri- ously disturbed over the loss of

Casting Gear Blanks in Centrifugal Dies



■ Ring gear blanks now are cast in centrifugal dies at Ford Motor Co.'s Rouge plant. Under development for more than two years, process employs a turntable mounting 18 spinning dies. In a four-minute cycle, one operator loads the dies, another pours molten steel, a third removes finished blanks. Centrifugal casting is faster and simpler than forging, produces stronger gears, say company's metallurgists

extra good wages they were earning, have been going around to the smaller local die shops seeking to get jobs, and a few of them have been hired. One die shop here, working day and night, and even throughout Memorial day, put on several Briggs men, reasoning that good workmen are difficult enough to find, and it would be folly to refuse a job to an efficient man when ample work is available.

This is the lush season for die-makers and with a base wage rate of \$1.30 per hour, time and a half for overtime and double time for Sundays, a good man probably can earn \$100 per week. Thus it is easy to see why men, idle because their union leaders have called a strike in protest against a company's failure to settle 28 minor plant grievances, take steps to re-establish their earning power. The busy season on dies has only about three more months to run, so the hay must be made while the sun shines.

The smaller die shops around the city report all the work they can handle at the moment, and a considerable volume yet to be closed. One shop has sufficient work to keep busy well into September, employment at two-thirds of peak and business at about the level of 1936 which, for Detroit interests, was above the level of 1937. This suggests that perhaps some of the die work which has gravitated away from Detroit because of high labor rates has returned this year. The explanation is believed to lie in the good deliveries which can be guaranteed by Detroit die shops, plus the fact that quality of work is known to be high. These two factors apparently outweigh the almost 50 per cent premium on labor rates for local shops.

■ THE WEEK'S suspension in assemblies by Ford was not generally anticipated, but is believed to have been planned so that production schedules for the balance of the run on this year's models could be rearranged and a general balancing out of stocks could be effected. Assemblies will resume this week on the basis of about 2300 daily, including 350 Mercurys, 250 of the 60 model and 1700 deluxe models, representing a scaling down of about 50 per cent from the 20,000 weekly production in force before last week. These figures indicate a 7 to 1 ratio in production between the deluxe model and the standard or 60 model, and are typical of what other producers have encountered this year in respect to standard vs. deluxe models.

Meanwhile tractor production for June at the Ford plant has been set at a reported 200 units, with requests out for additional equipment which would permit boosting this output

to 200 per day on short notice. The tractor engine, by the way, is practically a replica of half of the Mercury engine, with the block vertical, naturally. Bore, stroke and other details are the same, and many parts are interchangeable.

Ford engine designers are expending considerable energy in the direction of reducing weight of the present engine in the interest of increasing power and economy. Perfection of the new high-octane fuels by oil companies has stimulated all engine designers toward stepping up compression ratios and reducing weight, so that more efficient power plants

of small, lightweight process of development believed to be based largely being done for Europe, not for any future domestic

■ NEW sand casting alloy for use in aircraft has been developed by the Bronze & Aluminum Co. of Cleveland, and is reported to have good properties at high temperatures. From tests at Wright field, Dayton, the air corps has approved and designated it as ES-1. It is known as a T-1 alloy containing 95 per cent aluminum, and the following percentages of other elements: Copper, 1.57 per cent; Magnesium, 0.90 per cent; titanium 0.4 per cent; chromium 0.4 per cent. Tensile strengths of 500-750 degrees shows tensile strength from 15,000 to 18,000 psi per square inch and maintains low elongation of 4 per cent. Maintenance of these high temperatures to recommend the alloy for uses in aircraft engines.

Automobile designs are in vogue when it comes to the use of articles and devices to attract the public eye at the air shows for example. Nash lines will illustrate this by making use of catwalks almost precisely like airplane wing and extending out the side of a long, narrow radiator about 12-14 inches before into the front fenders. The "airplane wing catwalk" vertical bars of bright metal spaced closely and giving a waterfall effect. Viewed from the front, the suggestion of wings is unmistakable.

Chevrolet sales for the first days of May totaled 25,800 trucks, an increase of 36 per cent over the corresponding year ago.

Edward L. Allen, of the Products Co., plastics material, told the World Automotive Engineering Congress in New York he visions the day when you walk up to your car, push a button and the door will open. The door will be light, movable and the floor will be wide and flat. The roof will be curved translucent material will admit the health-giving sun, at the same time glare. A series of buttons will regulate the temperature and to any desired condition. Pressing another button will reveal a concealed bed from the partition between the passenger and engine compartments. Other conveniences, such as lavatory facilities, will be

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1937	1938	1939
Jan.	399,186	227,130	353,946
Feb.	383,900	202,589	312,141
March.	519,022	238,598	389,489
April.	553,231	238,133	354,263
4 mos. ...	1,855,339	906,475	1,409,839
May.	540,377	210,183	*306,000
June.	521,153	189,399	.....
July.	456,909	150,444	.....
Aug.	405,072	96,936	.....
Sept.	175,630	89,623	.....
Oct.	337,979	215,296	.....
Nov.	376,629	390,350	.....
Dec.	347,349	407,016	.....
Year. ...	5,016,437	2,655,777	.....

*Estimated.

Estimated by Ward's Reports

Week ended:	1939	1938†
May 6	71,420	53,385
May 13	72,375	47,415
May 20	80,145	46,810
May 27	67,740	45,120
June 3	32,445	26,980

†Comparable week.

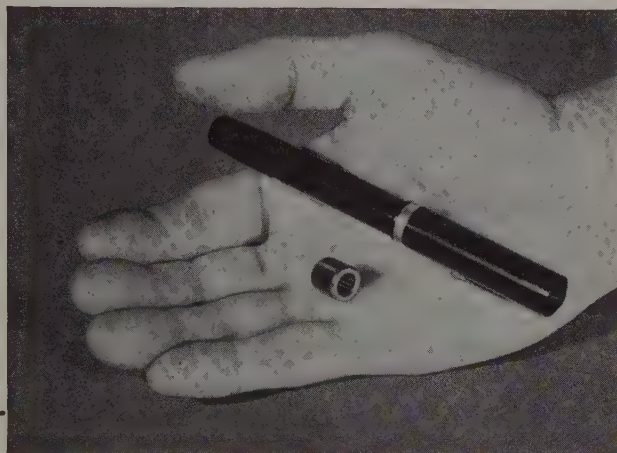
	Week Ended	
	June 3	May 27
General Motors	23,670	31,680
Chrysler	1,100	5,650
Ford	1,600	20,350
All others	6,075	10,060

can be achieved. In one motor design, identified as 91AX, Ford engineers are understood to have lowered block weight 50 to 60 pounds by thinning certain sections and reducing ribbing to a minimum. Of course, this is purely an experimental undertaking and as yet is said not to be approved by the engineering department. It merely indicates what motor builders are contemplating in forthcoming designs.

Ford appears definitely committed to engines of higher horsepower and size, such as those in the present 85 model and in the Mercury. Some discussion even is heard of eventually making the 95-horsepower engine the standard plant in the deluxe model and putting further improvements in the Mercury engine. Talk

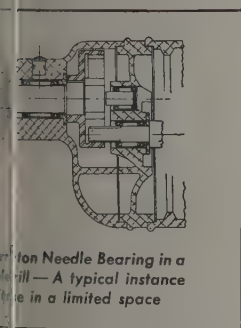
WHEN SPACE IS AT A PREMIUM

use the TORRINGTON Needle Bearing



limitations in the design of products seem to demand the things? Then you can frequently take advantage of anti-friction by changing over to Needle Bearing.

its simple design and its the Needle Bearing can substituted for a plain bushing



ing additional space. Con-
mple, the portable drill
typical application where
premium. See how easily

three Needle Bearings were incorporated in the design. In most cases the Needle Bearing can be mounted in your present housings; a change in the size of housing bore is the only design modification needed to accommodate the bearing.

Change is Inexpensive

You will find the change-over to anti-friction construction surprisingly inexpensive. The Needle Bearing is lower in unit cost than other types of anti-friction bearings, and its installation involves little labor expense. Built as a single compact unit, with the rollers permanently assembled in a hardened retaining shell, the bearing is readily pressed into position in the housing bore.

Your customers will appreciate the greater efficiency of the Needle Bearing, and the small amount of service attention it requires. Lubrication is efficient and thorough. The retaining shell, provided with turned-in lips, forms a reservoir for grease or oil, and the rotation

of the needles constantly supplies lubricant to the rotating shaft.

The Needle Bearing is ideally suited for severe service in high-speed application. Its full complement of rollers provides many linear inches of contact, with consequent high radial load capacity.

If you are using plain bushings because of space limitations, investigate the possibilities of this small anti-friction bearing. The Torrington Engineering Department will assist you in laying out applications.

For further information, write for Catalog No.10. For Needle Bearings to be used in heavier service, request Booklet No. 103X from our associate, Bantam Bearings Corporation, South Bend, Ind.

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Branch Offices in all Principal Cities

TORRINGTON NEEDLE BEARING

MEN OF INDUSTRY

■ F. E. VIGOR, manager, Ashland, Ky., division, American Rolling Mill Co., Middletown, O., has been promoted to general transportation manager, with headquarters in Middletown. R. R. Smith, since 1930 general superintendent, Ashland division, succeeds Mr. Vigor as manager, and R. G. Adair, assistant director of personal and public relations, has become assistant manager of Armco operations in Ashland.

Mr. Vigor, in addition to becoming general transportation manager will be associated in the management of the company's coal and ore properties and river transportation. He has been associated with Armco since June, 1910, when he was employed as chief clerk in the traffic department.

Mr. Smith joined Armco in 1912 as a foreman in the sheet mills, later becoming sheet mill superintendent. In 1922 he was transferred to Ashland. Mr. Adair, associated with the company since 1917, has held several important positions in Armco's personal and public relations activities.

Other Armco appointments include: K. C. McCutcheon as general superintendent of the Ashland plant; W. Fred Songer, assistant to manager at Ashland; W. F. Johnston, assistant to general superintendent, Middletown plant; and J. W. Paton, special representative in charge of Armco's properties at Ashland.

Henry A. Weyer, engineer, formerly with the Nazel Engineering & Machine Works, Philadelphia, is now associated with the Chambersburg Engineering Co., Philadelphia.

Joseph C. Elliff has resigned as western manager, *Saturday Evening Post*, to join the Stewart-Warner Corp., Chicago, in an executive sales capacity, effective June 15.

Vincent H. Godfrey has been added to the general sales staff of Page Steel & Wire division, American Chain & Cable Co. Inc., Bridgeport, Conn., with headquarters at Monessen, Pa.

W. Robert Timken has been appointed assistant to the president, Timken Roller Bearing Co., Canton, O. Since graduating from Harvard university in 1933, he has been active in the office and factory, serving in various capacities throughout the plant.

H. T. Hamilton, who was the first office boy for Carnegie Bros. & Co., early predecessor of Carnegie-Illinois Steel Corp., retired June 1 as treas-



F. E. Vigor



R. R. Smith



R. G. Adair

urer of Carnegie Natural Gas Co., after 52 years of continuous service with Carnegie companies. In 1892 when Carnegie Steel Co. was organized, Mr. Hamilton worked for L. C. Phipps, then the treasurer. Subsequently he became secretary for D. M. Clemson, general superintendent,

and when the latter became president of Carnegie Natural Gas Co. and a director of Carnegie Steel Co. Mr. Hamilton was closely associated with him for 27 years. In 1938, Hamilton became assistant treasurer of the gas company and in 1938, was made treasurer of the Carnegie Steel Co. and the Apollo Gas Co. subsidiaries of the United States Steel Corp.

Charles R. Hook, president of American Rolling Mill Co., Middletown, O., was given the degree of commercial science by Georgia Institute of Technology, Atlanta, Ga., at its twentieth anniversary exercises May 28.

Guido G. Behn, head of Motor Car Co.'s engineering department from 1910 to 1929, retired, has returned to Germany as a member of the board of directors. In 1909 he joined the engineering firm which he founded the company.

James A. Farrell, chairman of International Foreign Trade Association, former president, United States Steel Corp., has been promoted to Captain Robert Dollar, "distinguished contributor to the advancement of American foreign trade."

Clarence E. Searle and Ramsey have been elected directors of Worthington Pump & Motor Corp., Harrison, N. J. Mr. Searle, associated with Worthington since 1932, is vice president in charge of sales, while Mr. Ramsey has been in administrative charge of the company since 1920.

A. W. Lehman has been promoted to manager of the advertising and sales promotion department of Air Conditioning Company, Inc., Ashland, O. He has had wide experience in advertising and sales work with jobbers and his former associations with Storage Battery Co. and American Storage Battery Co.

Howard V. Searle, the former sales representative of New York metropolitan Federal Machine & Welding Co., Warren, O., has resigned. He is now representing the National Welding Machines Co., Detroit, Mich., in the same area. He was located at 30 Church Street, New York.

W. M. Nones, heretofore president of Norma-Hoffmann Bearing Co., Stamford, Conn., has been elected chairman of the board. He succeeded as president by J. H. Nones, formerly executive

Mr. Wilson re-
of treasurer. H. J.
y, has been made
nd secretary, and C.
president in charge
ions. E. C. Lennon,
nted assistant secre-
tant treasurer, and
auditor.

is been named super-
H. F. Brier, assistant
Gary works rail
Illinois Steel Corp.
succeeds the late
as been with the cor-
1919, when he began
electrician at Joliet
19 he was transferred
as a test engineer
was transferred to
stant superintendent,

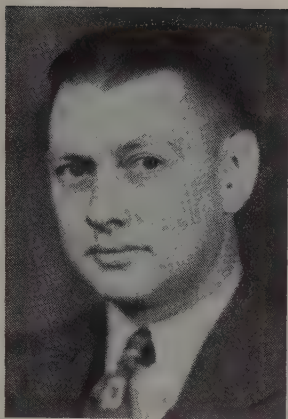
no succeeds Mr. Deck,
works in 1918. Since
as been employed as
rator, section inspector
nd mill foreman. On
ar he was appointed
reman, rail mill.

Diamond Alkali Co.,
ed president, Purchas-
Association of Pitts-
officers are: Vice
M. Potter, Vanadium-
Co.; treasurer, E. C.
onal Bearing Metals
ary, C. H. Rindfuss,
ew & Bolt Corp.; na-
J. M. Knowles, Con-
Co. Inc.

Jolly, director of pur-
chief engineer, Alumi-
America, Pittsburgh, was
ent, National Associa-
asing Agents at the
y-fourth annual inter-
ntion in San Francisco
s a former president,
gents' Association of
nd last year served as
resident of the sixth
s a member of the as-
cutive committee.

main Creighton, since
the chemistry depart-
more college, Swarth-
as elected president,
al society at its an-
in Columbus, O., re-
officers are: Vice
A. Pritchard, Mon-
a; Alexander Lowy,
nd J. D. Edwards, New
Pa.; managers, C. E.
umbus, O.; K. G. Soder-
us, and J. A. Lee, New
er, Robert M. Burns,
secretary, Colin G. Fink,
iversity, New York.

meeting, Dr. Francis
director of research
Aluminum Co. of



C. C. Deck

America, was awarded the Edward Goodrich Acheson medal and \$1000 prize. Dr. Frary is a past president of the society and is known for his achievements in the metallurgy of aluminum.

I. A. Yost, formerly assistant manager of engineering, lighting division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed manager of engineering, lighting division. Division headquarters are at Edgewater park, Cleveland. Mr. Yost has been with Westinghouse since 1924. After completing the student's course, he was assigned to the illumination engineering section at the East Pittsburgh works; two years later was transferred to the lighting division, then located at South Bend, Ind., and when that division was moved to Cleveland in 1930 he was transferred there.

DIED:

■ KENNETH EASTON PORTER, Cleveland district sales manager, Pittsburgh Crucible Steel Co., May 24 in Cleveland. He was employed for a number of years in the railway sales division of Carnegie-Illinois Steel Corp., in Cincinnati, and later joined Ludlum Steel Co. He joined Pittsburgh Crucible in 1925.

Frederick C. Hersee, president and general manager, Cambridge Screw Co., recently in Belmont, Mass.

Charles B. D. Wood, 55, president, Pressed Steel Co., Wilkes-Barre, Pa., at his home in Kingstown, Pa., May 27. Mr. Wood founded the company in 1909.

Alfred M. Pratt, 43, general supervisor, John Hassall Inc., Brooklyn, N. Y., maker of wire nails, in

that city, May 28. He joined the company 13 years ago.

Harry O'Connor, 72, retired superintendent, Anderson, Ind., plant of American Steel & Wire Co., in that city, recently.

Everett Wesley Pike, 70, superintendent, Detroit Steel Casting Co., Detroit, May 24 in that city. He had been with the company 26 years.

Virgil H. Hoagland, 64, a sales representative in Atlanta, Ga., for the Crucible Steel Co. of America, New York, in Atlanta recently. He formerly was with the Louisville and Nashville railroad.

Arthur Cavanaugh O'Connor, industrialist, recently at his home in Grosse Pointe Farms, Mich. He was an organizer of the Hanna Furnace Co., Cleveland, and the Weather-proof Body Co., Corunna, Mich., and was a director, Michigan Wire Cloth Co.

Gottlieb Weil, 83, pioneer steel leader, May 23 at his home in Braddock, Pa. Going to Braddock in 1878, Mr. Weil started in the Edgar Thomson steelworks. At the time of his retirement in 1905 he was in charge of the converting department of the Edgar Thomson works.

Philip J. Stremmel, 63, for many years associated with Granite City Steel Co., Granite City, Ill., in Bentonville, Ark., May 15. He joined the Granite Iron Rolling Mills in St. Louis, Granite City Steel's predecessor, as a scrap bundler, and was hot mill superintendent when he retired several years ago.

Frank W. Tufts, since June, 1936, sales promotion manager, Continental Steel Corp., Kokomo, Ind., in that city, May 24. A graduate of the University of Michigan, at one time he was with Detroit Steel Products Co.; was assistant to the managing director in charge of market analysis, sales and advertising, General Motors New Zealand Ltd., Wellington, New Zealand; and also did retail sales development for Nash Motors Co.

T. Morey Rude, 54, vice president, Bundy Tubing Co., Detroit, at his farm in Memphis, Mich., May 27. He joined the company in 1922 in a sales capacity, later becoming sales manager, and in 1933 vice president. Prior to his association with Bundy he was affiliated with the Weston-Mott Co., Flint, Mich., in production control work; purchasing agent with Remington Arms Inc., New York; and purchasing agent of the Scripps-Booth Co., Detroit.

Senator Tydings Advises Wisely

■ EVERYONE in a responsible position in industry can benefit from a careful perusal of the address (p. 15) by Millard E. Tydings, United States senator from Maryland, before the forty-eighth general meeting of the American Iron and Steel institute. This is not because the senator told the leaders of the steel industry anything that they did not already know about what is wrong in this country's economics and about the remedies that are needed. It is because the senator, all through his speech, called upon industrial management to assist the millions of workers in this country to a knowledge as to what is necessary to provide more and better jobs for them.

"Let the 50,000,000 workers of this nation know, through information and education," pled the senator, "that theirs is the biggest stake of all in a revived business; that the present state of affairs demands that business in every form, big and little, should be encouraged, not discouraged; helped, not hindered; supported, not attacked; for with the coming of confidence and the revival of business there is work for the unemployed at good wages and steady hours, a better market and better prices for the farmer, a decrease in the governmental burden of taxation and a normal way of American life."

Co-operation Is Needed To Educate Worker on Benefits of Business Revival

Everyone likes to hear his own beliefs clothed in fine language and delivered by an able speaker. That fact undoubtedly had much to do with the full measure of applause with which Senator Tydings' address was received. For management in the steel industry knows that the bulk of the industrial income dollar is spent in wages. It knows that the bulk of the taxes are paid by the wage-earner. It fully believes that the present national administration is literally filled with men who "preach

democracy and free enterprise while they set in motion the machinery to destroy it." It is keenly aware that the only road to recovery is through "the revival of the private business of the nation." It is fully in accord with Senator Tydings' 8-point program for putting the country on the road to better times.

Yes, the senator told the steel men what they already firmly believed. A fine speech, was the general comment. It remains to be seen, however, what the men who listened to the speech will do about its main feature, the senator's call for co-operation in educating the workingman and woman as to what a revival in business would mean in terms of more employment and security.

Day of Demagogic Political Claptrap Nears End; Factual Teaching Increases

Industrial management has learned a lot in the past few years about relating, in the public mind, its fortunes with those of the average individual. Many companies, large and small, have systems for informing their employes about all factors that affect volume of production, company income, wages, schedules of hours, dividends to stockholders and the like. Many of the annual reports to employes which have been set up in the past couple of years are notable for the wealth of information they convey to wage-earners. Manufacturers also are helping the cause along by speaking publicly, in increasing numbers, on how to improve the lot of the average individual.

For too long a time windy politicians and demagogues enjoyed a practical monopoly in molding public opinion. Accumulating evidence indicates that these gentry have over-stepped themselves in the opinion of the general public. The way is paved for a return to sanity. Industry can help vastly to that end by intensifying its campaign of education as to what is best for the people of this country.

BUSINESS TREND

Decline in Auto Output Sharply Affects Index

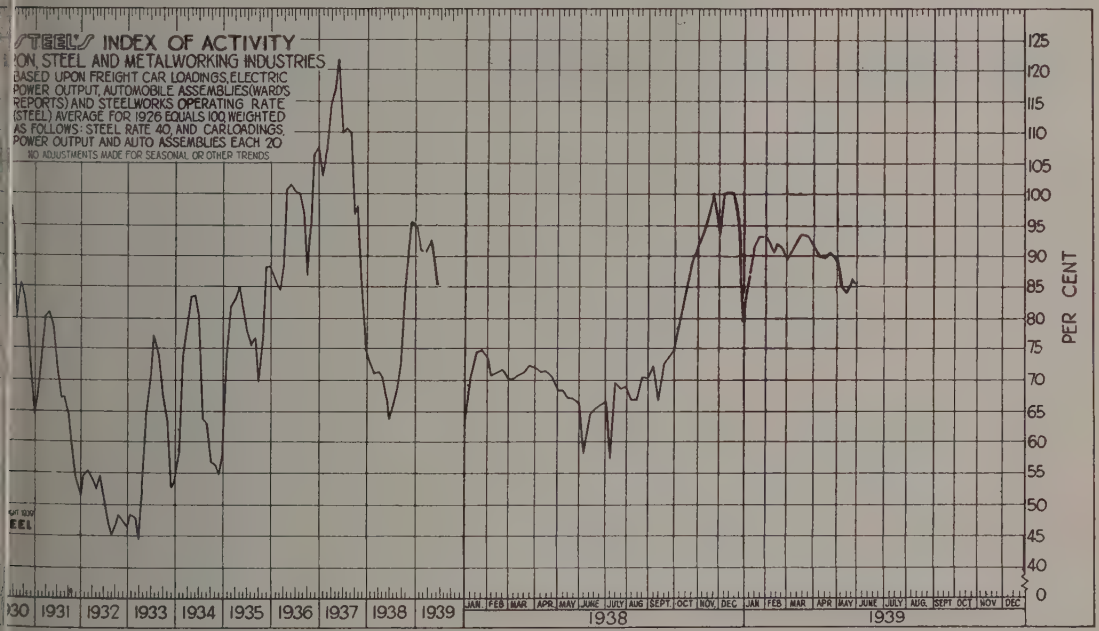
Following the lower level of industrial activity last May, STEEL's index average for the month was 65.3. This represents a loss of 7.3 points from the point this year of 92.6 recorded in March. The average compares with 67.4 in the same year, but is 10.6 points below the 1938 peak recorded last November.

The decline in automobile production during the May 27 more than offset the gains recorded in the three business indicators composing STEEL's

index. As a result the index eased 1.4 points to 85.2, thus forfeiting most of the improvement registered in the preceding week. At this time last year the index stood at 66.5.

The decline in automobile production during the week ended May 27 to 67,740 units represents a new low so far this year. The sharp falling off in assemblies was attributed to the strike at Briggs which in turn crippled operations at the Chrysler plants, due to the lack of bodies. Output in the week ended June 3 will touch another new low for the year, reflecting the extended holiday shutdowns.

Steelmaking operations reversed the downward tendency of the preceding eight weeks to record a gain of 2.5 points to 48 per cent in the week ended May 27. A year ago the national steel rate was placed at 28.5 per cent from which point it receded further



STEEL'S index of activity declined 1.4 points to 85.2 per cent in the week ended May 27:

1939	1938	Mo. Data	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
92.7	70.8	Jan.....	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
83.3	71.3	Feb.....	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
93.2	72.4	March.....	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
92.2	72.0	April.....	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
90.0	71.3	May.....	85.3	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
89.7	71.4	June.....	...	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
90.4	70.8	July.....	...	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
89.2	68.4	Aug.....	...	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
85.1	68.5	Sept.....	...	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
84.2	67.2	Oct.....	...	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
86.6	67.1	Nov.....	...	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
85.2†	66.5	Dec.....	...	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

to 25.5 before the upswing got underway about the middle of June. Current indications seem to indicate that the low point in steelmaking operations this year was reached in the week ended May 20.

Revenue freight carloadings recorded little change in the week ended May 27, due in part to the abnormal improvement registered in the preceding week which resulted from the resumption of soft coal mining. Electric power consumption in the week ended May 27 regained most of the ground lost since the week ended April 1.

COMMODITY PRICES SLIGHTLY LOWER

The all commodity wholesale price index of the United States Department of Labor eased 0.5 point to 76.2 during April. Excluding February, when the index remained unchanged, the latest decline represented the sixth consecutive month the index receded to lower levels. The April index figure is the lowest recorded since July, 1934. Early estimate for May indicates little variation from low levels prevailing through April.

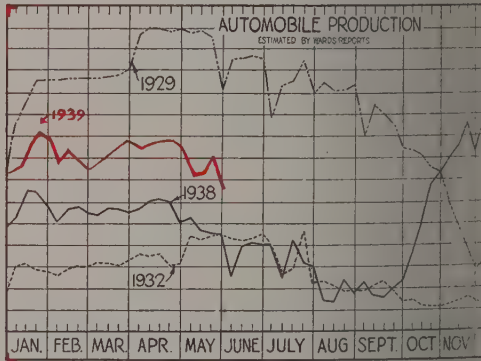
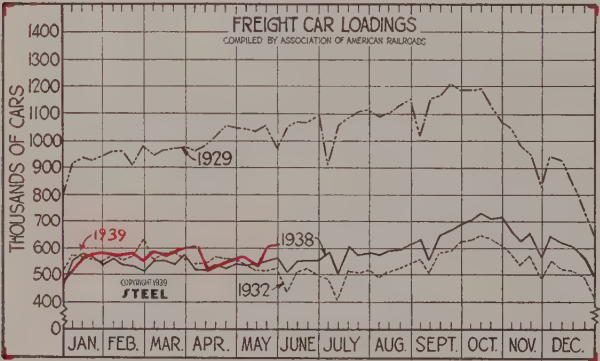
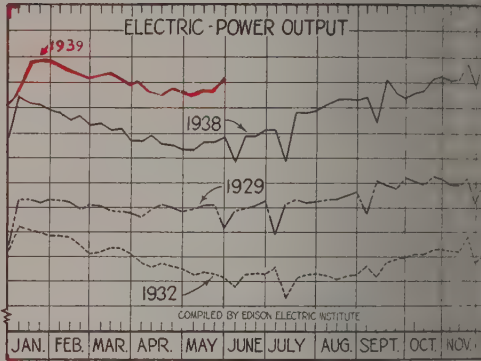
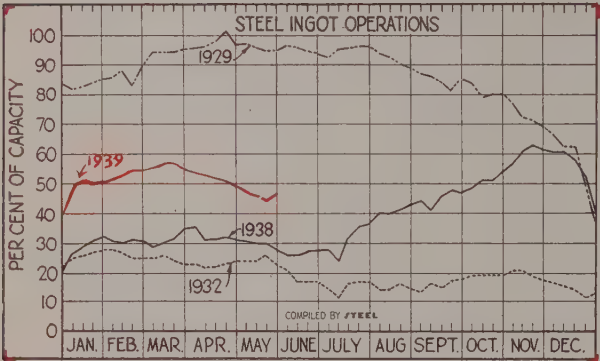
AUTOMOBILE OUTPUT DECLINED IN APRIL

Production of automobiles including passenger cars

and trucks in the United States and Canada, 35,226 units to 354,263 during April but ten per cent above the 238,133 units assembled in comparable months last year. A continuation of upward tendency in automobile production during April indicated in the estimated total output for of close to 300,000 units. In May last year totaled 210,183. Estimated retail sales of cars last month show a small gain over April, namely 3 per cent, however, the increase over responding month last year is substantially

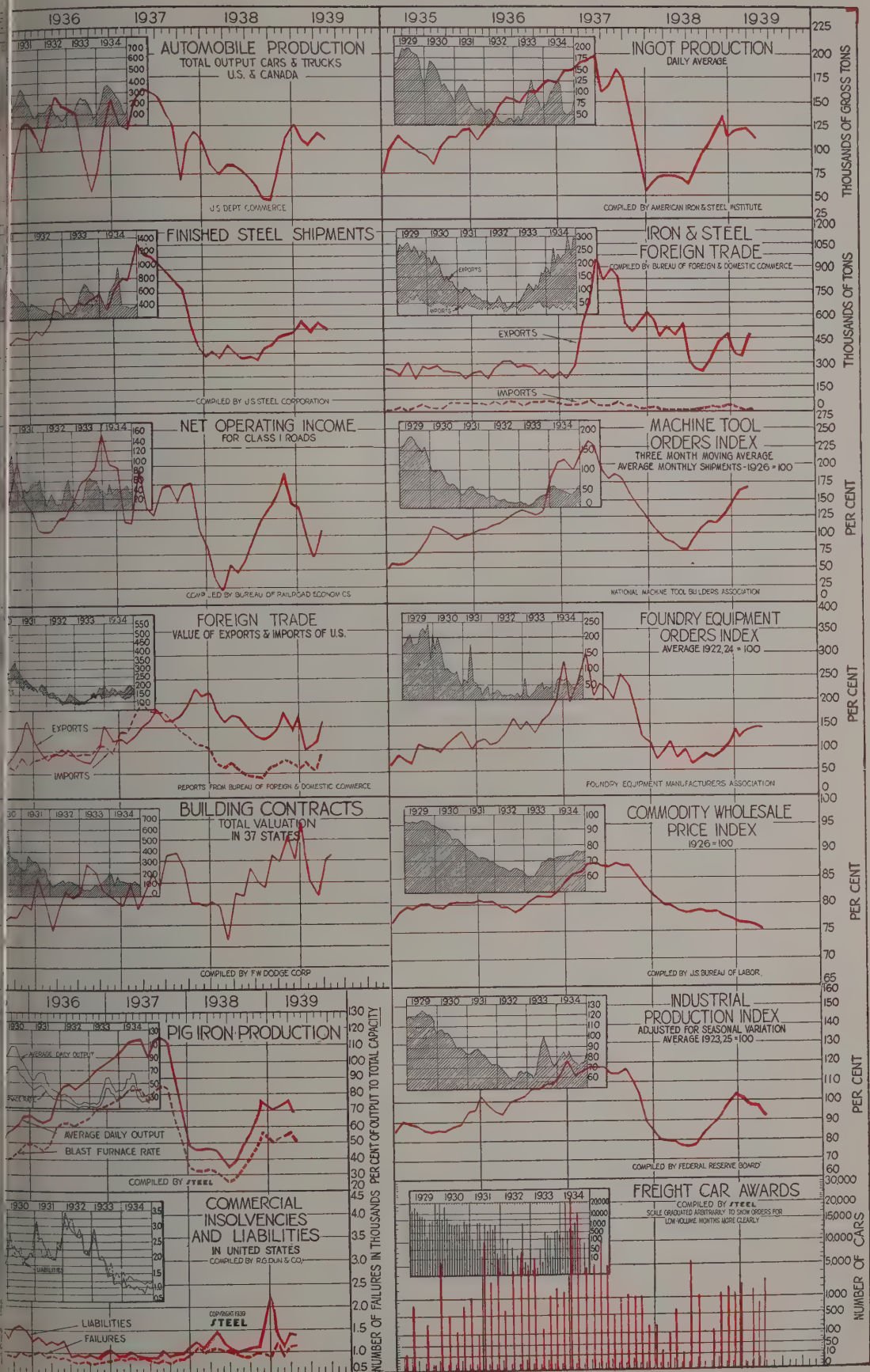
INDUSTRIAL PRODUCTION OFF DURING

Volume of industrial production declined in April, as recorded by the Federal Reserve monthly adjusted index. The decline in the index reflected chiefly the shutdowns at bituminous coal mines and reduction in activity at textile mills. Purchases by consumers remained unchanged. Employment showed little change during April. The index declined considerably reflecting fewer workers. The index of production declined 6 per cent of the 1923-25 average, but remained above the index figure of 77 recorded in April, 1939.



Week ending	Steelworks Operating Rate Per Cent				Electric Power Output Million KWH				Freight Car Loadings Thousands of Cars				Weekly Automobile Output			
	1939	1938	1932	1929	1939	1938	1932	1929	1939	1938	1932	1929	1939	1938	1932	1929
Feb. 4.....	53.0	31.0	28.5	85.0	2,287	2,082	1,588	1,728	577	564	575	947	79,410	51,443	27,111	27,111
Feb. 11.....	54.0	30.0	27.0	86.0	2,268	2,052	1,578	1,726	580	543	562	956	84,500	57,810	29,321	29,321
Feb. 18.....	55.0	31.0	25.0	88.0	2,249	2,059	1,545	1,718	580	536	572	958	79,860	59,100	30,411	30,411
Feb. 25.....	55.0	30.5	25.0	83.0	2,226	2,031	1,512	1,699	561	512	636	907	75,660	56,977	30,151	30,151
Mar. 4.....	56.0	29.5	25.0	89.5	2,244	2,036	1,519	1,707	599	553	560	977	78,705	54,440	31,391	31,391
Mar. 11.....	56.5	30.0	25.5	94.5	2,238	2,015	1,538	1,703	592	557	575	946	84,095	57,438	31,111	31,111
Mar. 18.....	56.5	32.0	24.5	94.5	2,225	2,018	1,537	1,687	594	540	585	958	86,725	57,558	30,591	30,591
Mar. 25.....	55.5	35.0	23.0	94.5	2,199	1,975	1,514	1,683	605	573	561	961	89,400	56,800	32,591	32,591
Apr. 1.....	54.5	36.0	23.0	95.0	2,120	1,979	1,480	1,680	604	523	545	967	85,980	57,500	35,751	35,751
Apr. 8.....	53.5	32.0	22.0	95.5	2,173	1,990	1,465	1,663	535	522	545	956	87,019	60,975	35,391	35,391
Apr. 15.....	51.5	32.0	22.0	96.0	2,171	1,958	1,480	1,697	548	538	567	972	88,050	62,021	35,771	35,771
Apr. 22.....	50.5	32.5	23.0	98.0	2,199	1,951	1,469	1,709	559	524	562	1,004	90,280	60,563	30,671	30,671
Apr. 29.....	49.0	32.0	24.0	101.0	2,183	1,939	1,445	1,700	586	543	554	1,052	86,640	50,755	31,111	31,111
May 6.....	49.0	31.0	24.0	97.0	2,164	1,939	1,429	1,688	573	536	534	1,050	71,420	53,385	43,841	43,841
May 13.....	47.0	30.0	24.0	97.0	2,171	1,968	1,436	1,698	555	542	517	1,048	72,375	47,415	42,381	42,381
May 20.....	45.5	30.0	25.5	96.0	2,170	1,968	1,435	1,704	616	546	516	1,046	80,145	46,810	43,471	43,471
May 27.....	48.0	28.5	23.0	95.0	2,205	1,973	1,425	1,705	617	562	521	1,061	67,740	45,120	45,121	45,121

† Preliminary.



Forum on



RE-EMPLOYMENT

■ Far from pessimistic despite his conviction that governmental policies have brought about a temporary lapse in individual courage and initiative, Walter B. Van Wart in this week's Forum makes a searching analysis of the current American frame-of-mind and contributing factors which hinder recovery.

Walter Van Wart is a Texan. He was born in Dallas in 1900 and attended the University of Texas, his college career being interrupted by the war. Having attained the rank of second lieutenant during the war, he began his industrial career in 1919 as shop helper in the Wyatt Metal & Boiler Works in Dallas. After eight years in the shop and two in the engineering department, he was appointed manager of the company's new plant in Houston. He was elected a director of the company in 1933, vice president in 1936 and since 1938 has been executive vice president.

"The American working man," says Mr. Van Wart, "interested as he is primarily in a job and in making a living, is apt to forget that if the profit system were destroyed in this country, his condition—instead of being better—would as a matter of fact become far worse. He does not realize that he would become a pawn of the government, to be assigned to jobs not of his own choosing but chosen merely to satisfy the immediate demands of the head of the state."

The Editors

■ Lasting business recovery and re-employment of unemployed employables in America, now totaling probably 11,000,000, is practically impossible until major changes have been made in our governmental policy. This is another way of saying that it cannot take place without a change in American public opinion.

Solution to the problem must be looked for not alone in the policies of the federal government but rather in the attitude of mind of the American people. Acts of the present national administration are not entirely responsible for present conditions. One needs only to review the acts of the 48 state governments to see clearly that the problem lies

deeper than the policies of the national administration.

The belief is now held by a large section of the American people that social security—which they interpret to mean financial security—is to be desired above courage and enterprise developed by self-reliance. This condition has, I believe, become basic and fundamental. Until there is re-established in the minds of American people the opposite belief—that one's chances in life are better by the development of self-reliance—the present low state of business in America will continue.

The statement often is made that in this or that foreign country which has overturned the profit system,

there are no labor troubles or unemployment. There is a great thought in America which is being thought to be opposed to the states, would nevertheless the Government take over a large number of functions which have been left to individuals to voluntary associations. Believers contend that if the government should regulate completely the activities of individuals in the future of the individual be more secure. This growth it may oppose a completely organized state, would have us on a road which inevitably would lead us in the list of totalitarian

Compare American with

In arguing for this policy of our national government these people leave out of consideration some vital facts. They take into consideration the being of the American in relation to citizens of other countries. They forget, for instance, that 90 per cent of the automobiles in the world are in the United States and that 40 per cent of the automobiles are here. They fail to consider in most of the foreign countries which they have in mind, four times as much labor is required to buy the necessities of life as required of the laborer in the United States.

In Italy, for instance, a layer or stone mason must work a half hour to buy a loaf of bread. This same loaf of bread can be earned by a layer or stone mason in the United States with labor of less than a half hour. This condition well-being in America was brought on by chance. It is the result of a definite public policy which we have maintained for 150 years.

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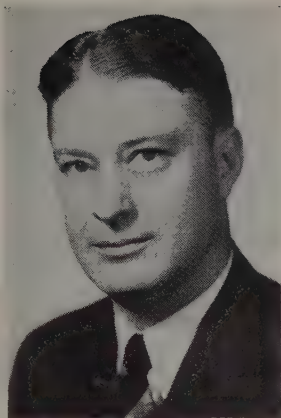
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© Parker-Griffith

Walter B. Van Wart
Executive Vice President
Wyatt Metal & Boiler Works
Dallas, Texas

"rigging prices" by the so-called parity payments, should be completely abandoned. Standing in the same category are laws for maintenance of price structures, such as the Robinson-Patman act and the Miller-Tydings act. These should be repealed.

I am convinced that if these steps are taken, business will show immediate improvement. At the same time I am convinced that we already have gone so far in our policies of subsidizing farmers and promoting public works at government expense, that we must work out of these conditions gradually.

Foreign Trade Is Declining

Another condition which has contributed materially to decline in business is the government's policy on foreign trade. America's foreign trade has been declining for the past 15 years. Average excess of exports over imports, not in gold and silver, in 1925 was \$946,924,000. By 1930 this excess of exports had decreased to \$743,845,000. Reports of the department of commerce show that in February of the current year exports failed to balance imports—if we except gold and silver. Total exports declined from \$4,397,000,000 in 1925 to \$2,455,000,000 in 1936. Recent releases of the department of commerce indicate that for 1939 exports will not exceed \$2,000,000,000.

This situation is vitally affecting the South which formerly exported large quantities of cotton. It is estimated by competent authorities that in 1939 the country will export less than 4,000,000 bales of cotton. This will be the smallest amount exported since 1884, and is less than half of the average amount exported in 1925 and 1926.

These figures prove conclusively that if we are to re-establish full business recovery something must

be done about foreign trade. We cannot continue to lose it at the rate it has been lost in the last 15 years, and hope to maintain a high degree of industrial activity. The Hull reciprocal trade treaties were well-meaning and did some good. They are totally inadequate, however, to meet this situation.

The whole tariff policy of the United States should be gone over by congress, with the idea of removing as many of the restrictions on trade as can be removed without lowering the standard of living of the American working man.

Revise Trade Laws

In this I am not advocating a policy of free trade. I am advocating only that all trade barriers—whether with foreign countries or within this country—should be removed, or at least lowered, to a point consistent with the highest development of our industries and the well-being of our wage-earners.

Foreign trade is not developed by a policy of withdrawing into our own trade territory and more than business recovery is promoted by "rabbits out of the hat" schemes. We must take a new hitch in our belts and go out into the markets of the world and get our share because we can do the job better than anybody else. To encourage business and industry to do this, restrictive trade laws must be modified in keeping with such a policy.

I am encouraged by the fact that certain signs already have appeared to indicate that America is making up her mind that "sleight of hand performances" will not take the place of courageous enterprise. For instance, more than one-fourth of our state legislatures recently adjourned without having added further to restrictive labor laws. In a few instances some of the worst abuses actually have been corrected. On one point only am I pessimistic. I am not certain but that the policy of applying "shots in the arm" has not been carried so far that we are going to have difficulty in shaking off the influence of the opiates.

Even though our national debt has reached an all-time high of over \$40,000,000,000, I still believe that by pursuing a consistent policy of cutting expenditures, we not only can stop deficit financing of the government but also can in time make headway in paying off this debt.

The whole question before us is: "Are we willing to attack this problem in an orderly fashion—admitting that while it is very difficult it is not insolvable?" If and when we make up our mind on this point, all the other problems will have been solved and business activity will rise to such a point that all our employables will be back on productive work once more.



Fig. 5—The several pieces making up the interchangeable or combination pattern shown in Fig. 4

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Co-operation Between

By A. J. WESTPHAL*

Atlas Steel Casting Co.
Buffalo

■ "A PLACE for everything and everything in its place." This can sanely be applied to the use of steel castings. They have a definite place in industry.

Buyers want a good product, at a reasonable price, along with prompt service. Starting correctly is half the battle. This means that proper design for good foundry practice should be discussed; pattern equipment should be constructed for correct heading and gating to permit sufficient feeding so no shrinkage takes place in the casting sections; specifications should be discussed to determine best analysis for physical values required. Also other necessary details should be fully discussed.

Often steel-casting representatives meet purchasers who are using other parts where steel castings should be

employed because the purchaser believes that they are more economical. Unless this issue is dealt with in a practical and understanding manner, no change will be made. In some instances no change should be made. In many others, a turn to steel castings will eventually save money for the buyer.

Co-operation Before Beginning

In one case the writer was asked to call at a shop where a machine was to be built and installed. It was to be a new design and the idea of the owner himself. After discussing the proposition it was sensed that someone with engineering ability would aid greatly and such a man in our organization was contacted. Then with the sales and operating representatives of the steel foundry and the prospective customer in a huddle, every detail was discussed. With this mutual co-operation, proper pattern equipment was constructed; the design was made as simple as possible to permit maximum machine efficiency; sections were reduced to a minimum sufficient to retain physical demands; some materials were put into alloys, and some

parts changed to other. It developed into a service machine for the customer, order for the foundry and able savings for the buyer. Well, because nothing was til it had been thoroughly by both parties. The steel proved their place. Today a real pleasure to visit this see the machine doing its ently and to know it was because of mutual co-operation.

Steel Castings Save Money

It has been a common belief that steel castings are expensive compared to some other materials. Perhaps not enough thought is given to the possibility of actually saving by use of steel castings. So steel castings can be decreed against some other product, retain the physical character. This tends to reduce the cost to the buyer.

As an example, a specific machine had been broken and causing considerable loss of time to install new part was not a steel casting. It had been approached on the m-

*Member Steel Founders' Society of America.

use of a steel casting. He thought the cost prohibitive, but when it was reduced in this instance in design made where the part was opportunity was given point.

parts of this first material were replaced with steel castings have been economical because they are. This cuts down orders and saves labor on the part, shown in Fig. 1 at point indicated with eliminated with slight and the warpage at section X stopped by proper no increase in metal. ease, because of trouble with steel castings, the soured on such production by the foundry, tion of the manufactur-

abrasive action took place and difficulty had been experienced with the steel castings. After the action was explained, another analysis was suggested and steel castings were retained with complete satisfaction.

Still another example of common understanding comes to mind. A certain intricate pressure casting, subjected to rigid test, was discussed thoroughly before any attempt was made to produce it. Through well-constructed pattern equipment made for practical heading and gating, the problem was mastered. The initial casting showed a defect, but by a simple alteration the balance of the order was filled satisfactorily. Fig. 2 shows the casting with risers (weight 1375 pounds) and Fig. 3 the cleaned casting (333 pounds).

On numerous occasions the customer has saved money on patterns by first approaching the foundry. In one case it developed that a combination or interchangeable pattern suf-

ficed to handle four different designs. Consultation by both parties unearthed this possibility. Fig. 4 illustrates the cylinder in one of its several sizes. Through adding or removing loose barrel pieces (marked XX), the cylinder may be lengthened or shortened. Also by using loose pieces shown in Fig. 5, anchor feet, A, may be added or removed as required. Fig. 5 shows the several pieces making up the interchangeable, combination pattern equipment.

The point is simply this: Co-operation between purchaser and producer in first discussing the "nature of the beast" permits most difficulties to be eliminated before any work is done at all. By doing this, steel castings will justify their use and show they do have a definite place in progressive industry because their chemical and physical characteristics permit less weight and consequently a decrease in cost to buyer.

rs, Sellers of Steel Castings

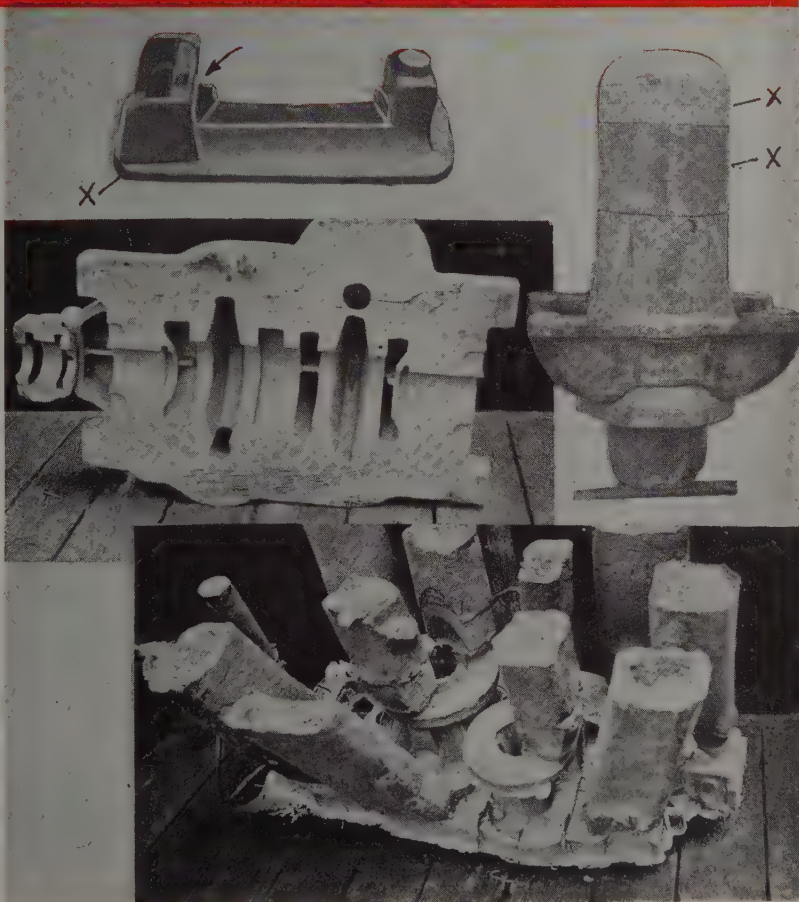
improper pattern construction through reconstruction to permit proper heading, the shrinkage and all was well. In castings, the proper the required function had found their place with the understanding of and the seller.

ns have much to do of steel castings. Such comes to mind where an

steel casting was used to al parts to solve a prob- age in a machine where replacements were elimi- and installation expense highly important here (top left)

r arrangement of heading is shown here made position of an intricate steel own in Fig. 3 (bottom) e casting as Fig. 2 but and gates removed (center left)

combination or inter- pattern handles four dif- designs (top right)





Making Auto Parts

Exceptionally efficient production of a large number of small parts is made possible by careful layout of departments, use of high production continuous processing and conveying equipment, completely mechanized overhead handling systems. Large automatic plating setups also help.

■ AT THE Guide Lamp division of General Motors Corp., Anderson, Ind., a complicated system of conveyors is utilized to handle efficiently a large volume of small parts consisting mainly of shells for headlights, tail lights, parking lights and similar automobile lamp assemblies, as well as bumpers, bumper guards and similar accessories.

Lamp shells in general follow an L-shaped path to the assembly lines. Reflectors and ornamental units follow a somewhat circular path on their way to the assembly lines.

Referring to the accompanying layout diagram of the plant, it will be seen that the northwest part is devoted to stamping and forming operations. Steel comes to this department in the form of sheets, is cut and blanked to size and fed into the stamping line. Stamping and forming operations on the large torpedo-shaped shells for head lamps are handled in five presses where in a series of progressive forming operations the extremely deep draw is produced necessary for this design.

Troughs Carry Shells

In this first group of presses the shells are carried from one press to the next by a series of troughs. Press operator upon removing the part simply places it on the trough which slopes toward the next press. Operator at that unit picks up the material, places it in his press, operates the machine and pushes the unit out of the back side where it slides down another trough to the next operator.

From this group of presses, the part proceeds to another line where work is handled from one stage to

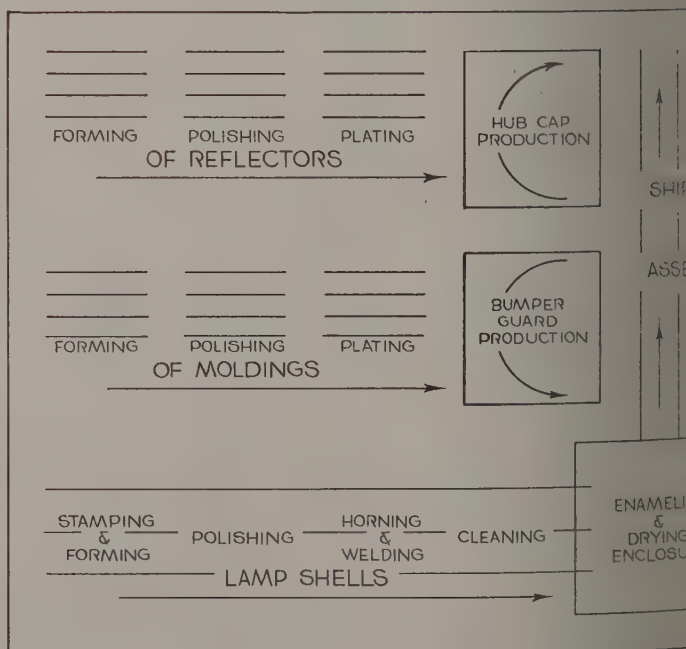
the next by a continuous belt conveyor with a dam in front of each work stage. Here additional forming operations finally produce the torpedo-shaped shell which is thoroughly cleaned and given a smooth surface preparatory to going through the finishing department. Parts proceed on overhead chain conveyor to the finishing department where the first operation is to give them a hot alkali wash. This is followed by a mild acid rinse, all on the chain conveyor. Parts then pass to drier on the same conveyor. The drying unit consists of an oven in which the temperature of 250 degrees Fahr. is maintained.

From this conveyor the parts are racked on a rack-type conveyor which carries them through the actual painting operations. Racking

and rack conveyor as well as subsequent painting operations are carried on in a completely sealed air in which is careful attention to prevent any dust or dirt from getting on the work.

Same Conveyor Returns

The overhead chain conveyor coming from the loading stage where the parts are placed on the rack conveyor is laid out that rejects are placed on the same chain conveyor and taken back to the stamping and forming department for cleaning or other operations may be required to prepare for finishing. This same conveyor is followed throughout the plant; that is, on each chain conveyor, and the large number of such units.

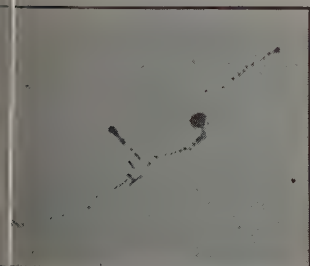


General layout of production lines at plant of Guide Lamp division of General Motors Corp., Anderson, Ind. Not complete or to scale

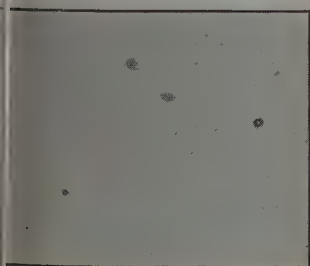
Low Calcium-Silicon Increases strength and ductility of Cast Steel

Use of calcium-silicon with reduced amounts of aluminum instead of aluminum alone for deoxidizing steel in the ladle eliminates harmful chain-type, eutectic sulphide inclusions and thus raises the strength and ductility of the steel. The averaged values of a number of tests on .36 to .40 carbon steel showed that this treatment raised yield strength 7.15 per cent, tensile strength 6.49 per cent, elongation 2.52 per cent, and reduction of area 5.82 per cent.

Ask to have one of our metallurgists call and explain fully how you can improve cast steel with calcium-silicon. He can help make your use of this and other "Electromet" ferro-alloys more profitable, without obligation. Electro Metallurgical Company, Unit of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York, N. Y. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.



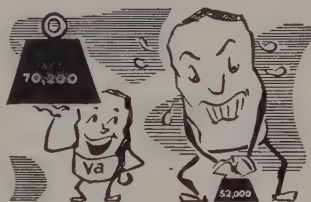
Harmful chain-type, eutectic sulphide inclusions segregated along grain boundaries in cast steel not treated with calcium-silicon. Magnification—500 diameters.



Inclusions in cast steel treated with calcium-silicon. The inclusions are dispersed and the steel has improved strength and ductility. Magnification—500 diameters. (Both micrographs slightly reduced in reproduction.)

Items of Interest about other "Electromet" Ferro-Alloys

Vanadium Increases Strength and Toughness of Medium-Manganese Steel Castings — The averaged values of a series of tests showed that the addition of 0.10 per cent vanadium to a medium-manganese steel raised the yield point from 52,000 to 70,200 lb. per sq. in., and increased the Izod impact from



20 to 58.7 ft.-lb. Tensile strength, elongation, and reduction of area were also slightly increased.

Use 3 Per Cent Chromium Steels for Wear-Resistant Castings — The 3 per cent chromium steels are easily hardened and relatively inexpensive. They are particularly suitable in service involving severe abrasion but little or no impact.

Zirconium Improves Machinability of Steel Castings — Zirconium in steel castings retards segregation of impurities at the grain boundaries, eliminates hard spots, reduces grain size and produces a cleaner and more uniform steel. As a result, machinability is greatly improved.

• • •

If you want more information about these and the many other "Electromet" ferro-alloys and metals and the service that goes with their purchase, write for the booklet, "Electromet Products and Service."

Electromet^{Trade-Mark} Ferro-Alloys & Metals

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sion is made so rejects can be placed on the same conveyor and taken back to the loading point for correction.

Lamp shells after being loaded on the rack conveyor are given first a prime coat of black. This material is heavily pigmented for color and protection of the metal. The enamel is applied by dipping the parts in a large tank.

Excess Enamel Drained

Rack conveyors, after lifting the units from the tank, proceed over a drip pan where excess enamel is allowed to flow off. Parts are given a bake at temperature of 410 degrees Fahr. for 45 minutes.

The second coat of enamel is applied while parts are still on the rack conveyor by dipping in a second tank of enamel especially formulated to give a high gloss and luster. This coat also is baked at 410 degrees Fahr. for 45 minutes. The bake ovens utilize indirectly heated air and include complete automatic temperature control.

A unique feature of this equipment includes special provision for handling the paint tanks. These tanks, each approximately 12 feet long, 4 feet wide and 3 feet deep, are mounted on wheels. Rails extend underneath the rack conveyor line so a full tank can be placed easily in position for the dipping operations. When empty, the tank is pulled out from under the line, passes through a turntable which takes it to a part of the finishing room where it can be refilled. In the meantime, a full tank has been moved to the turntable and placed

underneath the rack conveyor line. This arrangement of rails, turntables and switches enables a tank to be shifted completely in 15 to 20 minutes, thus providing minimum interruption to production.

Each tank is complete with filters and a motor-driven agitator. Also each tank is heated with steam so the enamel is maintained at a temperature between 88 and 90 degrees.

As will be seen from the accompanying layout diagram, parts have proceeded from the stamping and forming department in approximately a straight line through the cleaning operations to the rack conveyor. They continue on a straight line through this conveyor to the unloading stage at the far end. From here the parts are placed on overhead chain conveyors which carry them to the assembly department at right angles to the direction of motion all parts have been traveling. Of course there are different lines for different parts but the general flow of material is as outlined.

Bumper Guards Stamped

Bumper guards, also produced in this plant, are stamped from heavy steel stock in coils and travel roughly in a semicircular path through this department as indicated in the layout diagram. Bumper guards are blanked and then passed to the first forming operation. Some designs require a second forming operation before the anchor plate is welded into the back of the guard. This anchor plate has also been blanked and formed from heavy stock and a staking bolt placed through it. This

bolt has square body the square hole forming anchor plate.

After polishing and bumper guards pass to plating line. After comes application of then nickel color and mium plating. This is inspection and paint. Paint is then baked at Fahr. for about 30 min given a lacquered coat an aluminum body coat and then packing for s

Handling for all this is highly mechanized chain conveyors being processing points and ing areas.

Condensed Water Av

An interesting feature ing operations where important is the use of water from the steam avoid water stains on th

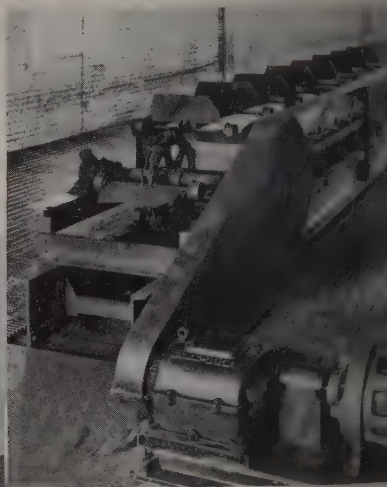
The automatic unit bumper guards handles pieces per hour plating square feet area per h employing current of 20.0. A second unit also is available has a production of 800 hour. Both of these units are automatic in operation loading of the work on the unloading of comp The automatic chromium line can handle 2200 bumper per hour, the output of plating units.

Nickel and chromium

(Please turn to P

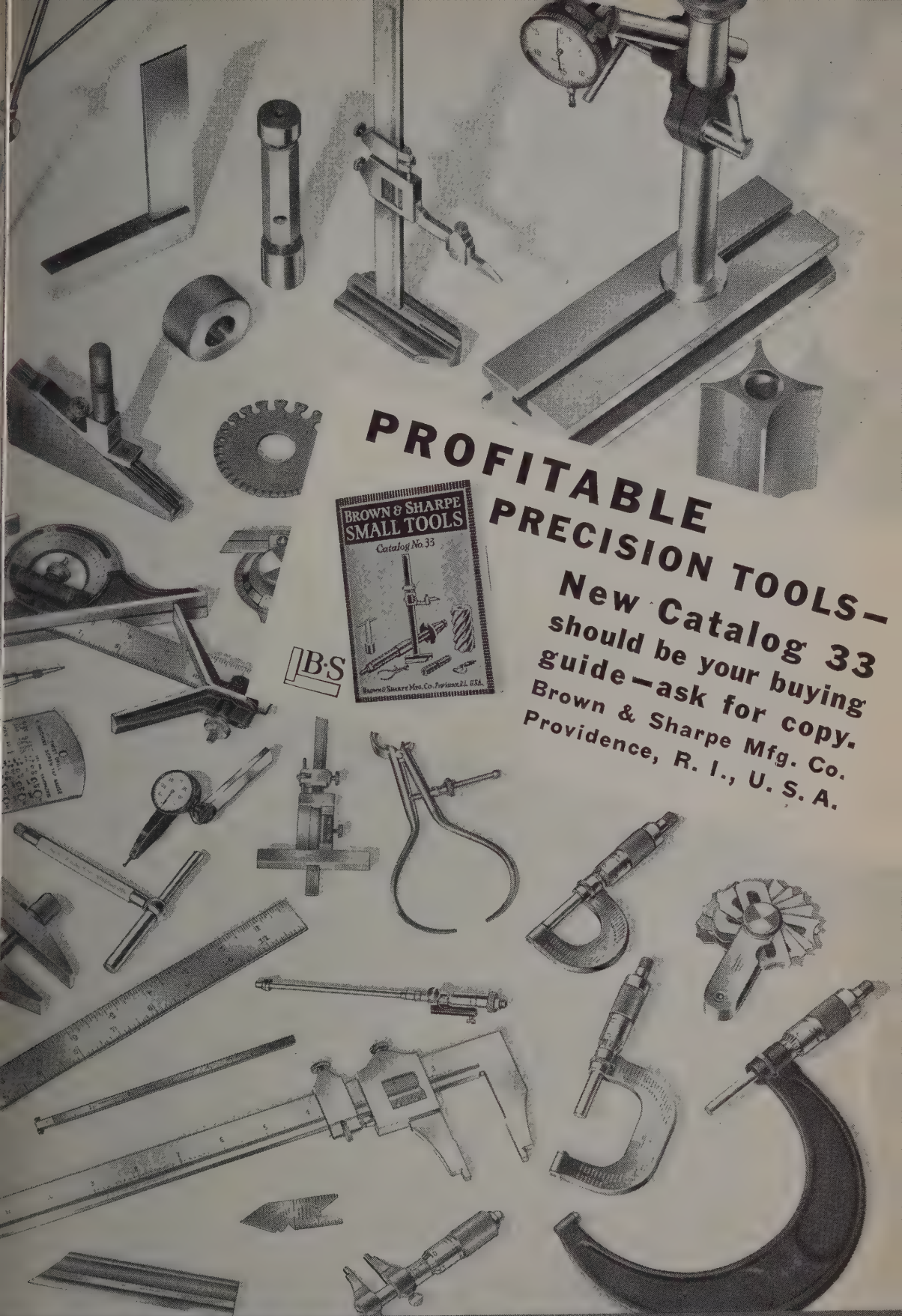
Inclined Elevator Expedites Coal Handling

■ At the new power plant (below) of Industrial Rayon Corp., Painesville, O., coal is stored in piles by a Link-Belt steam locomotive-crane. Coal is brought to bottom of inclined elevator which runs to flight conveyor over bunkers



This pusher-type conveyor receives coal from inclined and distributes it to bunkers. Photo courtesy Link-Belt

cago



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Dry, Boundary Friction

Many factors influence the coefficient of friction of a material. Results of recent tests on many materials may guide design and application engineers in sound interpretation of published data.

By L. M. TICHVINSKY

Reserach Engineer
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

■ **THREE KINDS** of friction are encountered in engineering practice: dry, boundary, and fluid friction. The first two types are as important as the latter, but only limited information is available due mainly to testing difficulties and the great number of variables entering into friction phenomena.

Thus the engineer using published data on friction must know exactly under which test conditions these data were obtained. If these conditions simulate his application, then the use of these data may prove to be satisfactory. If test and performance conditions are not similar, however, the respective figures for the coefficient of friction might be off by more than 100 per cent.

Elevator Motor Bearing Studied

This fact is illustrated by this example in which values of all three kinds of friction were recorded on the same unit under different conditions, of course: Coefficient of friction of an elevator motor bearing where starting was measured after various rest intervals. Table I shows the data. The bearing was 6 inches in diameter and 8 inches long. The load was equal to 300 pounds per square inch. Oil used had a viscosity of 200 seconds Saybolt at 100 degrees Fahr. and 46 at 210 degrees Fahr.

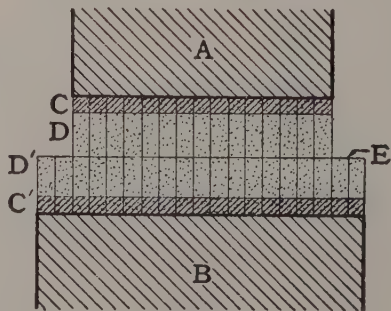
Early experiments indicated the friction of bodies was independent of the area of contact and was proportional to the normal load. This means that the coefficient of friction does not depend on the unit pressure between the surfaces in

Drive engineers, continually confronted with friction problems, find scarce information for selecting data on coefficient of friction in most handbooks. Usually some kind of commonsense interpolation must be made to allow for the particular service conditions at hand. The accompanying data may prove valuable in such instances.

contact. Later it was observed that in practical cases the coefficient of friction is independent of the velocity of relative motion between the rubbing surfaces. Experiments have confirmed the first conclusion, but there is quite a discrepancy between conclusions regarding the effect of velocity.

Thus investigators in 1925 found that friction did not change over a velocity range from 45 feet per minute to 120 feet per minute. On the other hand, measurements of the braking action of cast - iron blocks on hard steel tires indicate

Fig. 1—This shows adsorption layers in boundary friction. A, B are metal surfaces. C, D, C', D' are molecular layers. E is the sliding plane. C, C' are active parts of molecules. D, D' represents less active parts of molecules



that friction decreases as θ increases.

The physical phenomenon takes place under conditions which have not as yet been fully elucidated. It is as if the causes of dry friction were mechanical interlocking between surface molecules. Mechanical interlocking explains the high value of the coefficient of friction with rough surfaces and light loads. Polished gages with finely polished surfaces serve as an example of the theory of dry friction. The friction between surface molecules must be so great that it must be applied to solid blocks.

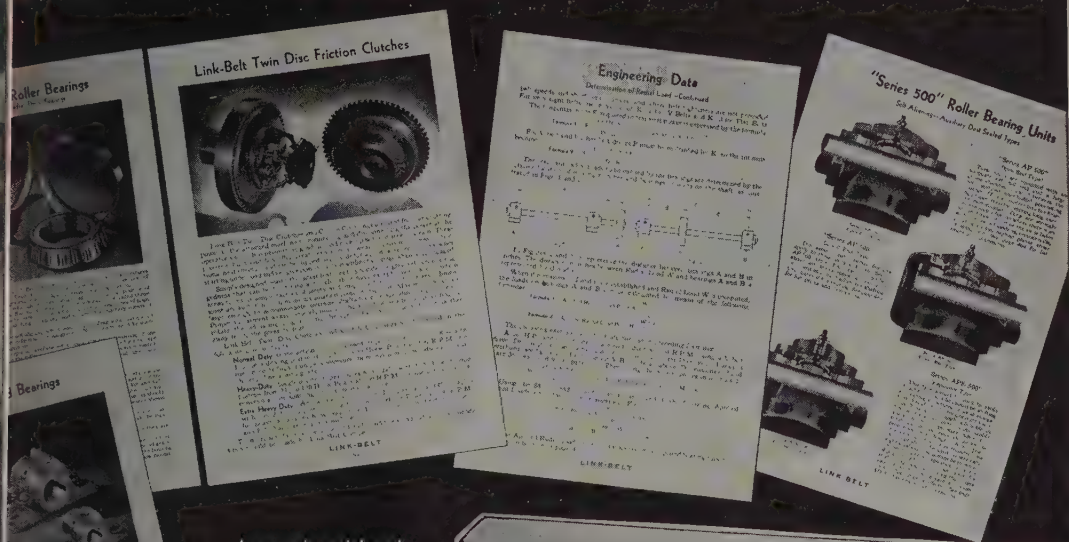
Dry Friction Experiments

Tests on dry friction with a machine consisting of an accurately machined wheel disc set rotating and then decelerated by the stationary spherical roller contacts lowered onto it. The results, mentioned here, are extremely interesting.

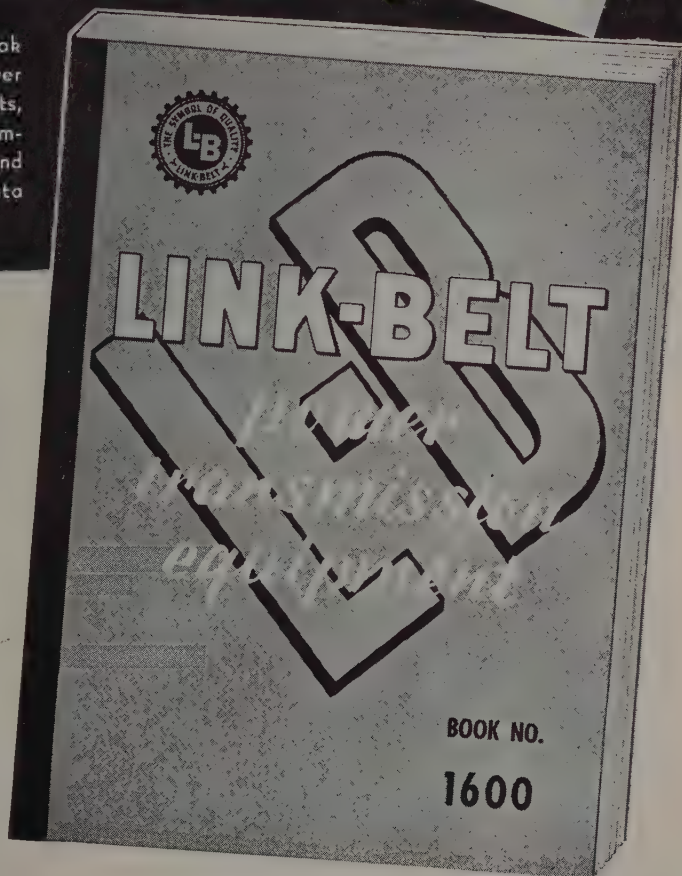
Effect of Load. With cleaned surfaces, coefficient of friction was independent of load within the limits of experimental error. Table II shows

Effect of Velocity. in friction with change can be detected by the slope of the deceleration curve. If the slope of this curve is constant it indicates a constant coefficient of friction. On clean surfaces it was found that the friction was constant at the high velocity at the end of the experiment down to the smallest velocity at which it could be measured accurately (about 1000 revolution per second). The coefficient of friction was constant.

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Table I—Three Kinds of Friction Recorded on the Same Unit

Coefficient of Friction— <i>f</i>	Rest intervals after which measurements were taken	Type of friction	
0.1085	15 seconds	Boundary or semi-fluid	
0.114	30 seconds		
0.119	1 minute		
0.129	3 minutes		
0.129	5 minutes		
0.131	10 minutes	Transition from semi-fluid to dry	
0.146	18 hours		
0.152	44 hours	Fluid	
0.003	Running at average speed of 100 feet per minute		
0.004			

Table II—Effect of Load on the Coefficient of Friction for Different Materials

Load	Glass on Glass	Mild Steel on Mild Steel	Hard Steel on Hard Steel	Nickel on Mild Steel	Carbon on Glass	Garnet on Mild Steel
Gm	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>	<i>f</i>
10.8	0.41	0.56	0.41	...	...	0.39
22.3	0.39	0.41	0.61	0.18	0.38	...
38.5	0.40	0.59	0.46	...	...	...
63.8	...	...	0.42	...	...	...
95.9	...	...	...	0.68	0.18	...

The coefficient of friction *f* is independent of load for clean surfaces over the range of loading used in these experiments. Final washing was done with pure alcohol and the surfaces were heated to 150°C. in an air oven to remove films of moisture or alcohol.

Table III—Effect of Finish on the Coefficient of Friction when Cadmium Contacts were Used

Disc Material	Surface	Coefficient of Friction <i>f</i>
Steel	Polished	0.449
Glass	Ground with fine emery	0.552
	Polished	0.309
	Ground with fine emery	0.457

rubbing speeds of 600 and 60 centimeters per second.

Contact Area. Prolonged running of the apparatus caused abrasion and flattening of the spherical surfaces so area of contact between the surfaces was greatly increased. There was, however, no change in friction. With glass contacts rubbing on a glass surface, this abrasion was quite marked, and the area of contact increased from a point to four square millimeters after a few minutes running.

Surface Finish. Data in Table III

show how the grade of finish of the disc surface affected the friction where cadmium contacts were used.

Dissimilar Surfaces. When dissimilar surfaces were used, the coefficient of friction depended upon which material composed the rubbing contact, as shown in Table IV for combinations of nickel, mild steel and glass.

This effect is most marked with nickel and steel. Where nickel contacts on steel gave a friction coefficient of 0.66, steel contacts on nickel gave 0.49. One figure is seen

Table IV—Effect of Dissimilar Materials on Friction

Rubbing Contact	Nickel— <i>f</i>	Disc Surface Mild Steel— <i>f</i>	Class— <i>f</i>
Nickel	0.53	0.66	0.56
Mild steel	0.49	0.57	0.61
Glass	0.50	0.51	0.40

Table V—Effect of Hardness on Friction

Rubbing Contact	Nickel— <i>f</i>	Disc Surface Mild Steel— <i>f</i>	Class— <i>f</i>
Hard steel	...	0.415	0.53
Aluminum	...	0.47	...
Copper-cadmium	...	0.32	...
Magnesium	...	0.42	0.42
Cadmium	...	0.46	0.30
Copper	0.49	0.36	0.53
Ebonite	...	...	0.53
Carbon	0.24	0.21	0.18
Garnet	0.37	0.39	0.45

Table VI—Effect of Atmosphere on Friction

Gas	Contacts	Disc Surface	<i>f</i>
Air	Mild Steel	Mild Steel	0.57
Nitrogen	Mild Steel	Mild Steel	0.57
Oxygen	Mild Steel	Mild Steel	0.58
Carbon dioxide	Mild Steel	Mild Steel	0.57

to be higher and one low either nickel on nickel steel. It may be noted that each of the three contact figures for dissimilar surfaces is greater than either of the similar surfaces. The results were obtained when the contacts were made from material.

An examination of Table II shows there is no systematic relation of friction with surface hardness, even when contacts are made from a soft material. The order of increase of friction is from hard to soft bearings. When extremely hard (garnet) were used, the results were reversed. Carbon contacts abrade any surfaces, and did not scratch all the surfaces, scarcely any abrasion to be seen.

Various Atmospheres. Microscopic surfaces examined by continuous abrasion on a fresh rubbing surface were being exposed. In air, the surface would be covered by an absorbed film of oxygen. If frictional effects were due to this surface layer, it might be expected that friction would be influenced by the nature of the atmosphere. Measurements of friction were tried out in air, nitrogen, and carbon dioxide to see if any effects could be detected. The results in Table VI show that the coefficient is the same in the limits of experimental error.

Friction Below Surface

This test indicates that friction is not confined to the molecular layers but extends to cause distortion and abrasion to some depth within the material.

These tests show, then, that in the limits of experimental error, friction is independent of load (1 to 25 grams), of the contact area ("point contact" or "area square millimeters"), of velocity (from 600 to 60 centimeters per second). Contamination of the surface can give large deviations from these results. There is no systematic relation between surface hardness and coefficient of friction. Apparently, the frictional effect is not confined to the surface layer of the material, but causes distortion and abrasion to some depth within the material.

A figure of 0.2 or more is a coefficient of friction indicating that the friction takes place in the bulk of the material.

Boundary friction has been suggested as a term to denote that of frictional resistance between solid surfaces fully or partially separated by a thin film of lubricant of which may

of molecules. The
actions between the
the fluid and of the
mine the nature of
resistance.

nents on boundary or
ion reveal that it de-
mber of factors such
adhesion and orien-
tation. Apparently ad-
hesion is the predom-
inant mechanism of lubrication
as a result of the
activity of the lubricating
film adhere to the moving

Molecules in Layers

on surfaces, continuous
layers are formed by
lubricants that cling
to the active ends to the
surfaces, shown schemat-
ically in Figure 1. Relative motion
in the sliding plane E
molecules meet with their
ends and cause the fric-
tion to decrease con-
siderable magnitude of forces
on the active parts of
the metal surfaces de-
termines chemical properties of
the kind and type
of surface.

Organic compounds—to
lubricants belong—the ad-
hesion to such metals as steel
is extremely high. In
view of their magnitude some
consider the adsorption
phenomena and firmly at-
tached to the metal. Ac-
cording to experiments at the
Bureau of Physical Chemistry
the value of the co-
efficient of friction is in-
dependent of velocity
of contact. These experi-
ments indicate that for some class
of surfaces the co-
efficient of friction is approximate-
ly constant. The de-
pendence of the coefficient of fric-
tion on load for some other
lubricants and surfaces
correlated according to
the nature of the lubricant or the
size of the molecules.
The coefficient from 0.01 to
0.1, depending on the
boundary that the friction takes
place in.

Casings

A range of oil well cas-
ings, standard sizes down to
2 1/2 inch diameter, with wall
thickness to meet practically any
demand announced by A. O. Smith
Tulsa, Okla. These casings
are made from rolled steel plates in
thicknesses and have minimum
weight of 105,000 pounds per
foot. Lengths average 50

Thermal Bonding Of Motor Parts

■ A NEW USE for high frequency
induction furnaces at the plant of
RCA Victor Co., Camden, N. J., is
the heating of Victrola motor lami-
nations for melting thermoplastic
cement while laminations are under
pressure so that they can be per-
manently bonded without the use of
rivets.

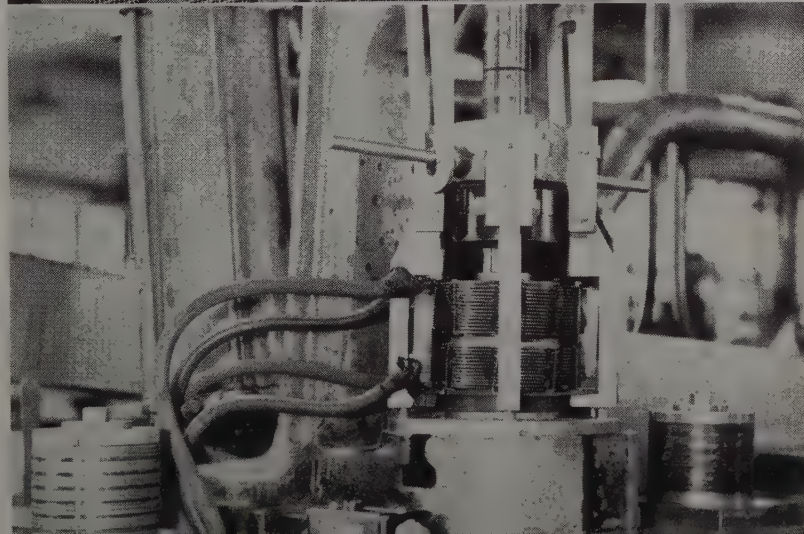
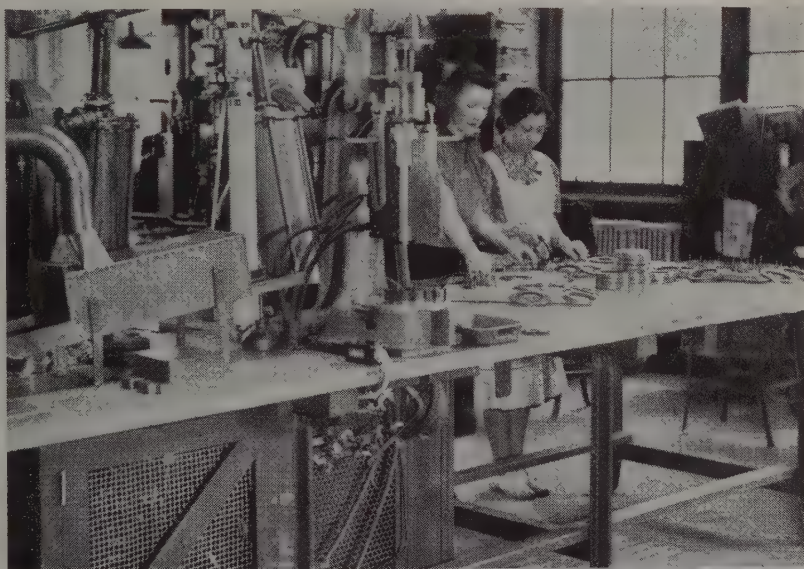
Motors produced by this method
are said to be quieter, more com-
pact and show a large saving in
both material and labor. Motors
made with riveted laminations
varied in quality due to the slip-
ping of these laminations during the
riveting operation. More transfor-
mer iron had to be used because of
the electrical losses caused by the
rivets. With the new method
greater accuracy of alignment is at-
tained, and the "once around" noises
are reduced considerably. Produc-
tion has been pushed to over 6000
laminated rotors or stators per day.
Diameter of the motor has been re-
duced 1 inch from that of the old

riveted design. Area is 30 per cent
less and weight has been lowered 48
per cent.

Equipment used for the bonding
operation consists of two standard
3-kilowatt high frequency converters
and two coils, all built by Ajax Elec-
trothermic Corp., Trenton, N. J.
Lamination assemblies are placed in
the furnace coil in stacks, and a
complete stack is heated to fusion
temperature and pressed in less
than 3 minutes. Assemblies are
bolted together and removed from
the furnace under pressure of the
bolt and are placed in an air cool-
ing chamber. After removal from
this chamber the bolt is taken out
and assemblies are ready for use in
the motors.

(Upper) Assembling laminations before
placing them in combination furnace
and press shown at center. Air cooling
chamber is seen at left, and high fre-
quency converter is located under the
table

(Lower) Motor laminations in place be-
fore lowering of pressure head. At left
is shown a rotor after the heating and
pressing operation. Bolt holds stack
firmly until after cooling is completed



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between capacitor and
source of power ... Re-
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effect better line regu-
lation.

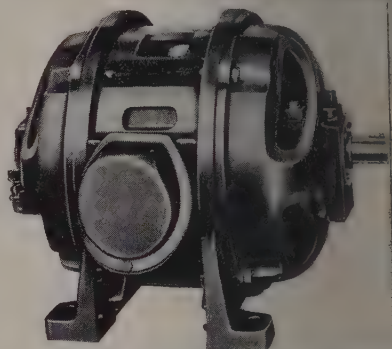
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WESTINGHOUSE CAPACITORS



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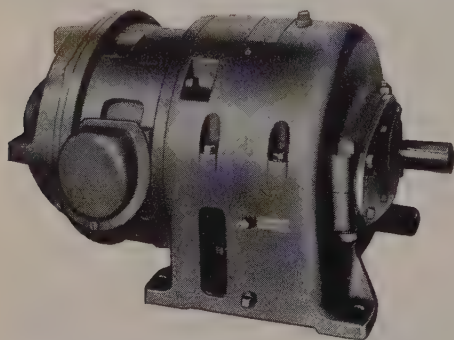
Extra mechanical strength in one-piece castings
Extra electrical strength in Tuffernell insulation
Ball or sleeve bearings, both with exclusive
Westinghouse features that eliminate lubrication



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of the driven machine. Simplifies installation ...
eliminates maintenance of belts, pulleys, sprockets
and chains.



WESTINGHOUSE GEARMOTORS



ALL NECESSARY CONTROL IN ONE PLACE

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labor ... Costs less
to install ... Gives
starting, overload
protection, manual dis-
connection, and No-fuse
protection.

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COMBINATION LINE STARTER



Westinghouse

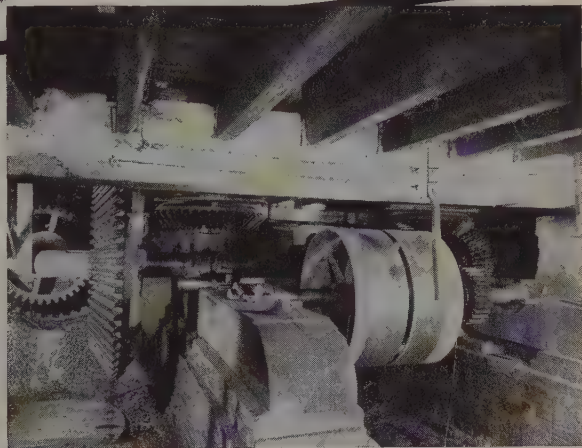
New Boiler and
 Steam Drive - \$30,000⁰⁰
 12 Westinghouse
 Gearmotors - \$6,744⁰⁰
Savings - \$23,256⁰⁰

COMPANY MODERNIZES ...GAINS IN EFFICIENCY AND FLEXIBILITY

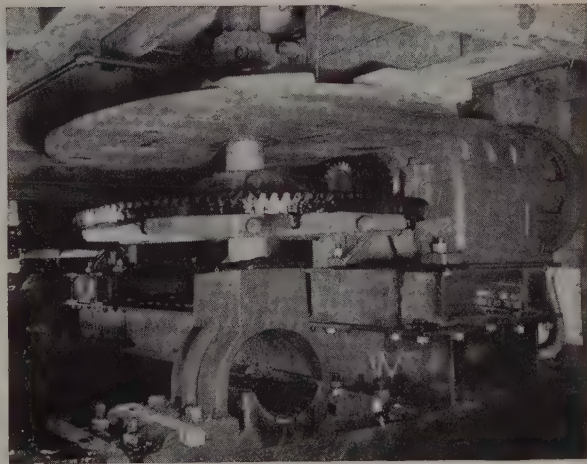
An American snuff manufacturer was confronted
 with the necessity of rehabilitating steam power equip-
 ment. A new boiler, steam engines and lineshaft drives
 cost about \$30,000.00. A Westinghouse gearing
 department pointed out that 12 gearmotors, in place of a com-
 plete drive, not only would permit utilizing the existing
 equipment but would save the company more than \$23,256.00
 in investment. While operating costs are com-
 parable, gearmotors offer the additional advantage of
 flexibility. As a result, the company operates only the
 equipment needed to meet production instead of all of them
 in the former system.

In any phase of industry, manufacturing engineers
 and management are effecting savings and like efficiency
 through greater flexibility by use of Westinghouse
 equipment and control. Perhaps your plan of modernization
 includes this unique Westinghouse service. If you are
 interested, simply write the nearest Westinghouse office
 and direct with Westinghouse Electric & Manu-
 facturing Company, East Pittsburgh, Pa., Department 7-N.

J-90191

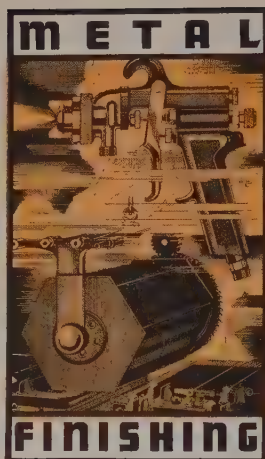


Before Modernization — Ponderous gears, heavy
 lineshaft, and huge belt pulleys operated these snuff
 mills. In case of trouble, the entire line had to be
 shut down.



After Modernization — twelve Westinghouse gear-
 motors, providing exact speed and horsepower for
 the driven load — at one-fifth the cost.

Motors and Control



Spray-Gun Motion Stu

Paying attention to a few, simple, underlying rules of motion study and spray-gun technique offers possibilities of greatly increased production with less fatigue and improved quality of work, as an authority here points out

By B. C. GARDNER

The DeVilbiss Co.
Toledo, O.

■ THERE IS an excellent opportunity for motion-study analysis in connection with use of spray guns to determine the most efficient methods of painting any particular project. Of course, the same system that would be used on one item may not be at all suitable for most efficient application of paint to another item. However, where mass production finishing methods involve the use of a spray gun, a detailed study of spraying technique for each type of item handled will usually be found an extremely paying proposition.

Study Flat Surface Spraying

Possibly one of the most elementary factors that should be understood thoroughly at the outset is the most efficient method of spraying a flat surface. Figs 1 and 2 illustrate the two most important things to watch. The proper method of making a spray gun stroke is to avoid swinging the spray gun in an arc. The arc method is wrong because too much paint is applied at the center of the stroke and too little at the extreme ends. Also, the distance between the gun and the work may vary almost on a ratio of 2 to 1. Waste due to excess vapor, of course, results. Center of stroke is wet while ends are dry and frosty.

Under such conditions it is easily seen why it is extremely difficult, if not almost impossible, to apply

a uniform layer of paint. The correct procedure is to hold the gun at right angles to the surface at all times and to trigger the gun at each end of the stroke; that is, begin the stroke, then pull the trigger. At the end of the stroke, release the trigger before the stroke is completed.

The reason some operators do not trigger the gun as suggested is quite simple. Instead of cutting down the fluid flow by adjusting it either at the pressure feed tank or at the fluid regulator, they make the mistake of adjusting it by means of the fluid adjusting screw on the spray gun. Turning this adjusting screw inward to reduce the material flow increases the spring tension on the trigger. Naturally, it becomes extremely difficult to pull and tires the operator's hand after a short period of time. This results in a tendency not to trigger the gun properly. This difficulty can be eliminated by permitting the fluid adjusting screw on the spray gun to be left wide open. Then, in prac-

tically all cases, the necessary adjustment can be made at the pressure feed tank or at the fluid regulator.

If this plan is followed, the operator will find that less material is consumed, there will be less fatigue for the operator, there will be reduced wear on the spray gun, such as tips and needles, and a better finished finish will be obtained.

The second important thing to watch is to hold the spray gun at all times perpendicular to the surface being painted. Fig. 2 illustrates the correct position of the spray gun should be held. Dashed lines indicate an incorrect position. Most satisfactory results are obtained when the spray gun is held some 6 to 10 inches away from the surface.

Figs 3 and 4 will serve to illustrate the correct and incorrect methods of spraying corners. As will be seen in Fig. 3, when the spray gun is moved up to and past the corner, painting one side, a certain

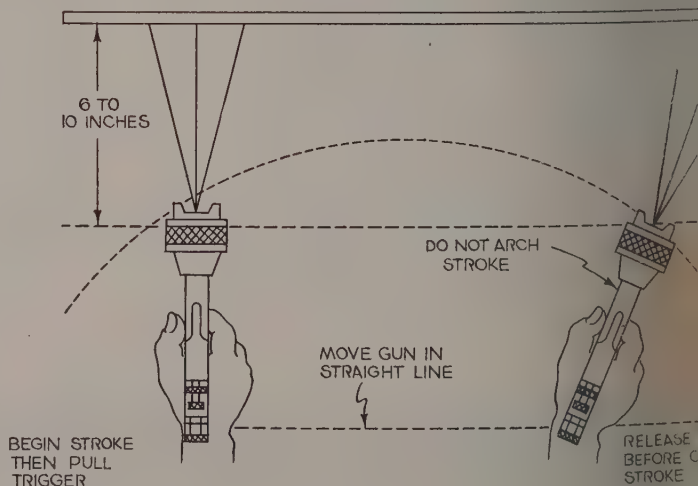


Fig. 1—Showing proper method of making a spray gun stroke. Gun is triggered at both start and end of stroke. Stroke is not arched but gun moves on straight line



messy oil
iving
razy at
ant ...



A SCREW MACHINE products plant in an Eastern state had an unhappy crowd of operators on their hands. The management wasn't too happy, either. Messy, evil-smelling cutting oil was making inspection of work difficult and operation of the machines unpleasant. The oil in use also had a tendency to separate when machines were left idle for a short time.

Shell was asked to try its hand at the problem. Working with the plant engineers, the Shell man began a careful survey of the threading machines, and the single- and multiple-screw machines.

After a series of experiments, he made his recommendation: the proper type and grade of Shell Cutting Oil to meet the problems in this plant.

Two years have passed since the Shell man made his recommendation and the oil was installed. Here, in plain words, is the record reported by the plant:

1. The oil is completely clean and odorless—inspection is easier and operators are well satisfied.
2. Finishes are considerably better than before.
3. Tool life has been increased and "down time" has been decreased, resulting in a greater net production.
4. In cutting brass, there is no discoloration of work as had sometimes happened before.

Here is a record—pure and simple—of a job accomplished by Shell for a manufacturer. Its importance lies in the fact that it is being repeated day after day in plants all over the country. Shell men working with Shell products can often save you dollars in maintenance—make production more efficient and profitable. Why not let a Shell man help *you*? There is a Shell office near you.

SHELL CUTTING OILS

of spray is sure to be deposited around the corner. Then when the other side is sprayed, there will be over-spray around the corners on both surfaces. To prevent this, it is recommended that the sides be painted up to within 3 or 4 inches of the corners as shown in Fig. 4. Then, by holding the spray gun at an angle with the corner, it can be raised and lowered to catch both sides of the corner simultaneously. This would apply to cabinets, cases, etc. which are finished in an assembled state.

Plan Gun Movements

In painting any particular assembly, the most efficient combination of spray gun movements to produce the desired coverage should be worked out carefully and not left to the individual operator's discretion. Someone familiar with motion study, working in close cooperation with a man in the finishing department who is thoroughly familiar with spray gun technique, may possibly produce the best system of painting any particular project.

In using any spray gun there are a number of adjustments of extreme importance. These should be studied carefully. Best results are dependent upon the proper flow of material from the nozzle, correct proportioning of atomizing air pressure of flow of material, and proper spray width. The usual spray gun contains an adjusting screw which affords control of the flow of material from the nozzle. As mentioned above, to assure maximum ease in

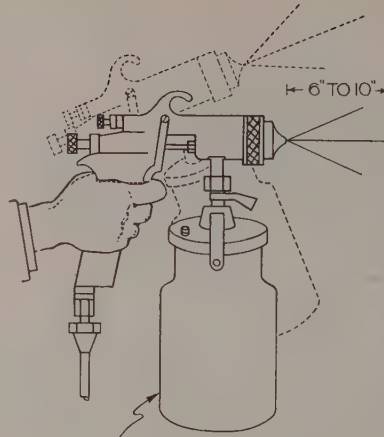


Fig. 2—Spray gun should be held perpendicularly to the surface as shown by solid lines here

triggering the gun it is recommended that this control be left wide open in practically all cases.

A second adjusting screw which is found on some spray guns controls atomizing pressure. Also, there is an air adjusting valve which can be attached to the air inlet of those guns not equipped with an atomizing pressure adjustment. A spreader adjustment affords a means of changing the spray pattern from a round spray to various width fan sprays as may be required.

In making adjustments of the spray gun, too high an atomization pressure is to be avoided since it will spread or thin out the center of the spray pattern. Insufficient air

pressure will produce a poor effect. This results in the covering the surface in drops. This adjustment should be checked by studying the pattern produced by the gun.

In working out a motion study for a particular product, a mental period using various combinations of the adjustments will give a value in determining the most efficient operation. Note the different results obtained from different adjustments, atomizing pressure and spreader adjustment.

Since flow of material from the gun nozzle determines to which the gun must be moved to cover the surface, the speed of movement sometimes can be increased by using a setting which produces a faster flow of material. To prevent excessive deposits which work out a sequence of runs which will prevent over the spray pattern as the gun is painted. A comfortably fast movement should result in sufficient coverage without runs or sags.

Keep Motions Continuous

Another important element has been found to increase the efficiency of spraying is the principle of keeping the motion continuous. From the time the gun is triggered when it is triggered off and the article is completely painted. This does not necessarily mean that the article should be painted

Fig. 3—Spraying corners this way results in depositing overspray

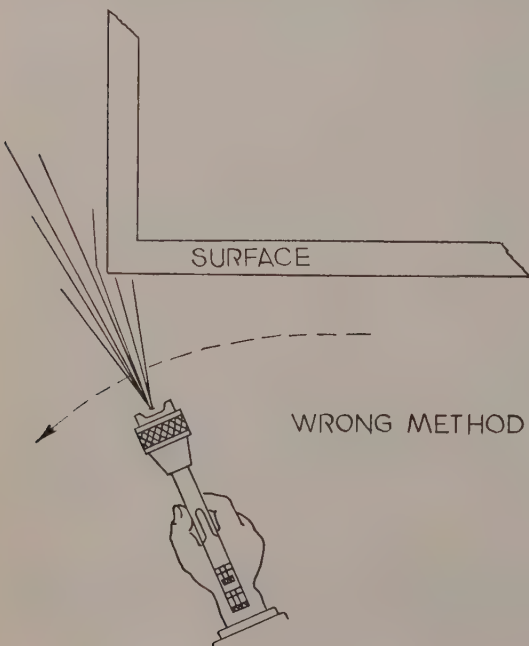
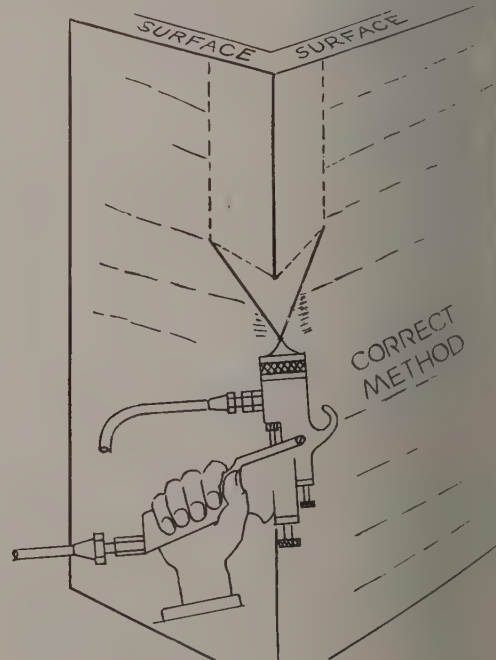
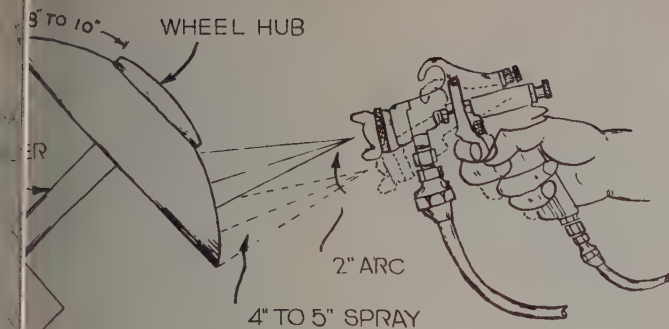


Fig. 4—Corners should be sprayed this way for best results





wheel hub in one continuous rotating work holder

the gun, but it does mean it should be done wherever the article permits. It is found that by mounting the work on a fixture that revolves easily it is possible to paint such objects with simple motions without the need for the spray gun more than once.

Continuous, or nearly continuous, operation of the gun will assure even coverage per unit of time and produce a maximum output in a spraying operation. In most cases it is usually necessary to use a fixture to hold the object being painted and to permit moving it from time to time to give complete access to all portions by working out a suitable sequence of motions for the complete coverage of the work. This can be obtained with a series of strokes and simultaneous movements of the fixture and the work.

Gun Operators

Makers of the spray painting associated equipment will be able to furnish definite suggestions for improving results. Suggestions made to the spray gun operators will enable them to reduce fatigue connected with the work, and if this is experienced when the motion is being made, it permits their cooperation. An efficient and careful motion study may result in making a significant improvement in painting operations as long as it is possible to get the maximum production from the equipment.

It is most essential to determine the directions of motion for the manufacturer regarding the way to clean the gun

and to keep it in the best operating condition if maximum painting efficiency is to be obtained.

Accompanying illustrations will show typical examples of recommended practice in spray gun motion. Where the object to be painted is of such a shape that it can be sprayed while it is rotated, the gun can be held open from beginning to end of the stroke. For example, Fig. 5 shows method used in spraying of metal hubs of wheels. The work here is held and rotated by the work holder. For this job a 5-inch spray is used. As the hub rotates, the operator simply pulls the trigger back and turns the gun in a 2-inch arc, painting the hub in one continuous operation.

Zig-Zag Stroke Unnecessary

To zigzag this stroke or to start at the top and move to the bottom and back up again would be unnecessary.

Fig. 6 shows how continuity of motion can be worked out for a flat surface such as a table top. Also, this shows a diagram of how continuity of motion may be planned for solid objects such as cabinets, metal covers, cases, etc. In both of these cases the spray gun is triggered to feather out the strokes.

In any motion study for spray guns it is desirable to determine the fewest number of strokes and least amount of motion necessary to ob-

tain the desired coverage. To this end, the design and use of suitable fixtures will be found a great aid.

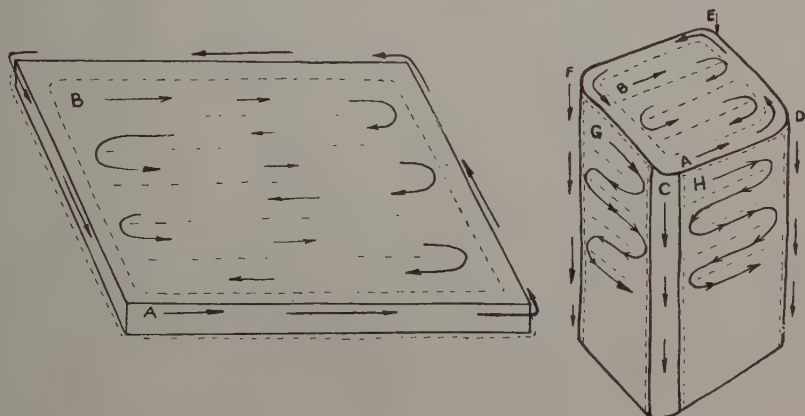
Effect Of Elements In Alloy Cast Irons

■ *Alloy Cast Irons*; semiflexible imitation leather, 270 pages, 6 x 9 inches, 111 charts and illustrations, 73 tables; published by American Foundrymen's association, Chicago; supplied by STEEL, Cleveland, for \$3; in Europe by Penton Publishing Co. Ltd., Caxton House, Westminster, London S.W.1.

A project of the gray iron division of the American Foundrymen's association, this volume covers the effect of 18 elements on the various properties of gray, white and chilled cast irons. Information is given on the effect of aluminum, bismuth, carbon, chromium, cobalt, copper, magnesium, manganese, molybdenum, nickel, phosphorus, silicon, sodium, sulphur, titanium, tungsten, vanadium and zirconium on such properties as tensile, transverse, shear, torsional and impact strengths, hardness, deflection, machinability, wear resistance, heat resistance, corrosion resistance, mass and section, electrical properties, thermal properties, chill, etc.

It also discusses the forms in which alloying elements are available commercially and the different types that are added to various melting units. General foundry practice used in the manufacture of alloy cast iron, covering such subjects as melting, molding sands, heat treatment, shakeout practice, cleaning and finishing, etc., also is covered.

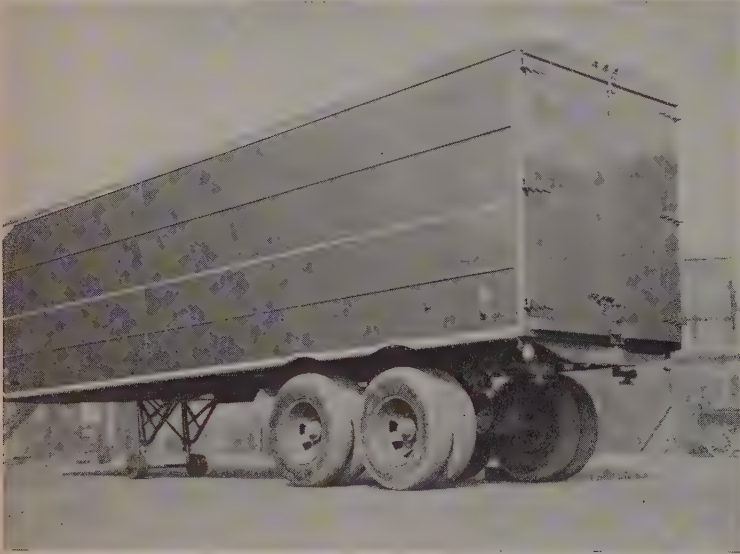
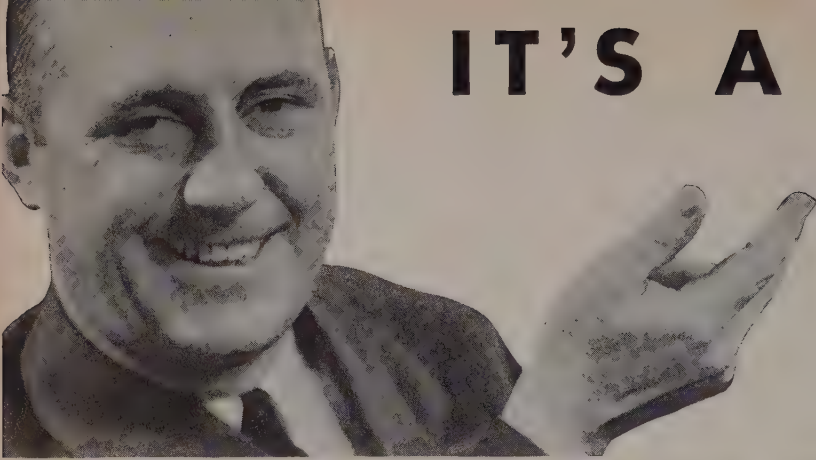
Of special interest is the chapter devoted to composition, mechanical properties, uses and service data on many types of alloy cast irons in commercial applications. For those desiring still more complete information on the subjects covered, a 25-page bibliography is available. The 14-page cross index makes the desired information easily found.



ing path of spray gun for efficient spraying

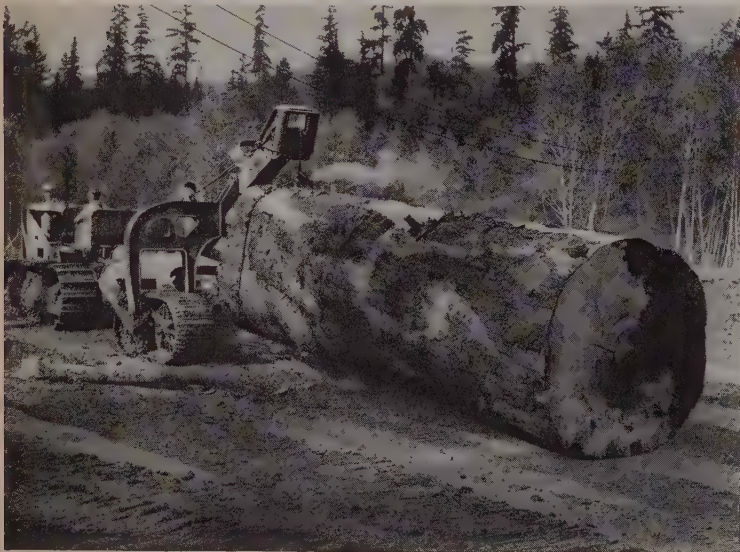
IT'S A DARE!

Weight



1800 lbs. lighter—carries 1500 lbs. more payload. Ultra modern design utilizes U·S·S COR-TEN in the bridge-truss type body frame. Reduces weight of this Fruehauf freight trailer 1600 lbs. under standard. Compared with old equipment now on the roads, the weight saving is estimated to run as high as 4000 lbs. Unit is 33' long, 8' wide, 7' high—weighs only 10,900 lbs. Built by Fruehauf Trailer Co. of California.

Hyster Boom-Arch built 20-30% lighter with U·S·S MAN-TEN. In this modern logging equipment, built by Willamette-Hyster Co., Portland, Oregon, the high yield point of U·S·S MAN-TEN makes possible substantial weight reduction without reducing high load capacity and great strength essential for this tough service. Saving weight leaves more horse-power available for work—permits faster return trips and safe operation up steeper grades. Increased footage handled, assures low cost operation essential for selective logging.



U·S·S MAN-TEN reduces weight one-third, assures obtaining favorable payload-deadweight ratio in the face of restrictions, the use of U·S·S MAN-TEN enables building of mixing drum and mixing blades of this Blaw-Knox 33 1/3%. Abrasion tests reveal MAN-TEN also ideally suits grinding action of sand, stone and cement—one reason drums or mixer blades has ever worn out in service.

U·S·S MAN-TEN saves 3750 lbs. in this mine trailer dump truck for open strip mine hauling, built by Company, Pittsburg, Kansas. Body of U·S·S MAN-TEN 25% lighter than similar capacity trailer with structural steel. Any truck body user will be interested in a steel that reduces deadweight like this. Weight saved can be converted into oil savings, reduced tire and brake maintenance, extra



U·S·S HIGH TENSILE STEELS

Our Equipment

AND COMPARE IT lightness, strength cost with U·S·S High Tensile Steel construction

It's a direct challenge to every user and builder of mobile equipment.

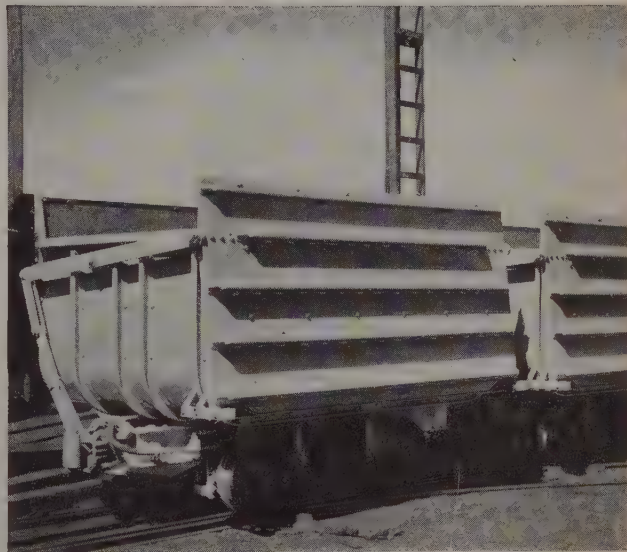
A safe reduction of deadweight with U·S·S High Steels—its resultant economies—its tangible increase in capacity and lower operating costs are well-proved facts. You can't afford to overlook them.

Consider the typical applications illustrated. How much equipment stack up? Is it still dragging useless deadweight? Is it wearing out long before it should? Does it give you the capacity you have to expect? Rebuild it, at low cost, with serviceable U·S·S High Tensile Steels.

U·S·S COR-TEN and U·S·S MAN-TEN have tensile strengths approximately 50% higher than structural open-hearth steel. Both are tough and enduring, highly resistant to shock and vibration and have 1/3 greater resistance to abrasion than mild steel. COR-TEN has unusually high resistance to atmospheric corrosion, 4 to 6 times that of plain steel. MAN-TEN has copper steel in rust resistance.

Because both these superior steels are low alloy steels, their price is low. Thousands of applications have proved they will reduce weight with little or no increase in cost. May we tell you more about them?

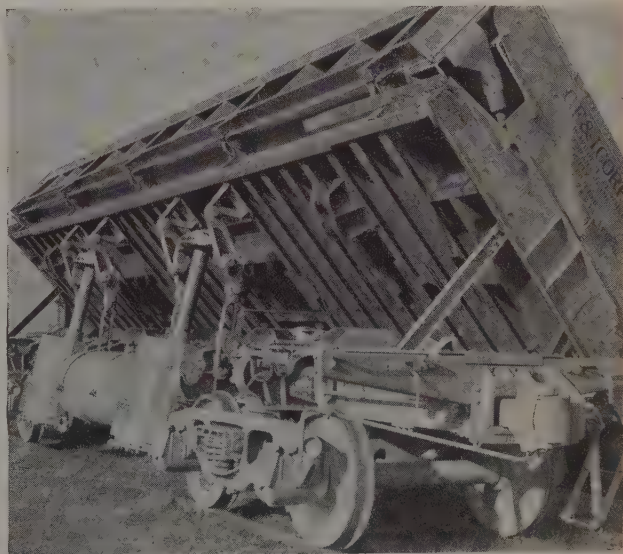
U·S·S STEEL & WIRE COMPANY, Cleveland, Chicago and New York
ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago
COLUMBIA STEEL COMPANY, San Francisco
NATIONAL TUBE COMPANY, Pittsburgh
B COAL, IRON & RAILROAD COMPANY, Birmingham
Steel Products Company, Chicago, Warehouse Distributors
and States Steel Products Company, New York, Export Distributors



U·S·S MAN-TEN mine cars weigh one ton less each. In 200 of these Granby-type mine cars, MAN-TEN construction has reduced weight 2000 lbs. per car. Used with electric motor haulage, 45 cars to a train, this 45-ton weight reduction effectively reduces power consumption.

Welded U·S·S MAN-TEN construction trims off 12,000 lbs. here. Reduction of deadweight from 69,000 to 57,000 lbs. in this Austin-Western 30 cu. yd. railroad dump car substantially reduces motive power of hauling unit required.

A 6-car train of these lighter MAN-TEN-built cars actually weighs less than a train of 5 cars of the previous type.



UNITED STATES STEEL



Welds To Be Carburized

Factors entering into selection of welding rod and welding procedure to produce welds to be carburized are discussed here. Tests reveal rod should be one producing least variation in grain structure and hardness between weld and parent metal

■ THERE ARE applications in the machinery field where welds are used on parts which are to be carburized. In these cases, problems arise which are not ordinarily encountered in carburizing. The following experimental information was obtained to investigate the phenomena involved in carburizing weld metal.

The welds in the test joined forged and annealed SAE 2315 steel, a 3½ per cent nickel material, widely used as a carburizing steel for miscellaneous machine elements. Proportions of the weld and points at which hardness tests were made are shown in Fig. 2. Two specimens were welded for each of four analyses of rods. One specimen was peened with an air hammer after each pass, the other specimen was not peened. The coated rods were 5/32-inch in diameter with 140 amperes at 22 volts direct current. The SAE 2315

Abstracted from *The Welding Journal*, published by American Welding society, New York.

Fig. 1—Microstructure produced by using a straight carbon rod. Magnification 50 diameters



By E. J. WELLAUER

Metallurgist
Falk Corporation
Milwaukee
And

G. C. DOEHLER

Engineer
Hevi Duty Electric Co.
Milwaukee

stock was forged and annealed. Welds were normalized at 1650 degrees Fahr., after which the weld bead was machined level with the parent stock. Specimens were carburized for 10 hours at 1700 degrees Fahr. in a vertical retort furnace using a gaseous carburizing medium. The sections to be hardened then were oil quenched from 1425 degrees Fahr. and drawn at 350 degrees Fahr.

Growth in section accompanies all carburizing reactions. In these specimens, the weld metal averaged from 0.001 to 0.002-inch less growth than the parent metal.

Cross sections of welds in carbon-molybdenum and 2½ per cent nickel

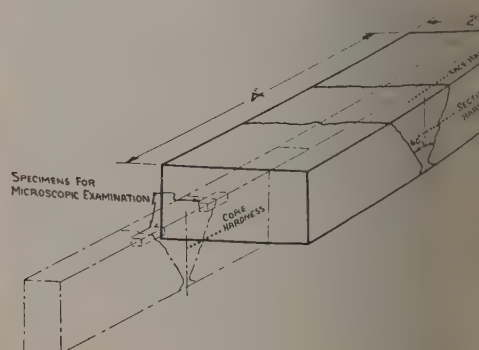
steel were uniform and indicating that carbon-molybdenum and 2½ per cent nickel produced the more desirable results with procedures used in tests.

The case depth and variation between parent and weld metal recorded in Table I. With exception of the SAE 2315 steel, carbon penetration into weld metal was less than the penetration into the parent metal.

Depth of carbon penetration was practically equal for the rods, except for the SAE 2315 steel where the greater penetration was probably due to the greater width of the weld. The carbon penetration into the peened and unpeened metal was practically equal.

Case carburizing is used for purpose of securing a high hardness on a specified surface. When a portion of the useful life of a surface, it is important that hardness obtained be within its specified for the parent metal. For the hardness readings, a micrometer screw was used

Fig. 2—Dimensions of specimens in tests with location of points for hardness



COPPER ALLOY BULLETIN

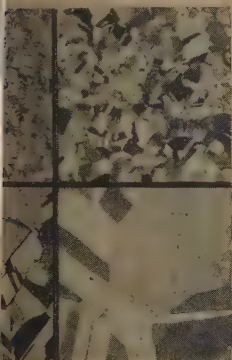
Reporting News and Technical Developments of Copper and Copper-Base Alloys

BRASS
"Bridgeport"
CO.

1939

BEST MEASURE FREE OF SOFTNESS

Softness of brass, a factor of importance in many fabricating processes, can most accurately be expressed in terms of average grain size. The grain structure of brass is revealed upon etching with a high-powered metallographic microscope when a sample is carefully polished and then etched with a solution of concentrated ammonium hydroxide and hydrogen peroxide. The grain structure of annealed wrought brass consists of a large number of individual crystals whose average size depends upon the temperature of the anneal. The grain structure of the anneal, the grain size, and the grain shape are all factors.



These microstructures illustrate the grain structure of brass at various temperatures. Mag. 75X

Grain size is specified in terms of average diameter of the crystals. Crystals are, of course, larger than the average size. Most of the brasses (wrought metal) have grain sizes ranging from approximately .001 millimeter to .090 millimeter. In some cases, the average grain size of brass is approximately from .001 to .006 inch. The individual grains or crystals of wrought brass are so tiny that they are not visible to the naked eye. If the metal is properly prepared for examination, it is difficult to see the grain structure with the naked eye. However, the grain structure, when viewed, is much coarser. Individual grains range in size between $\frac{1}{16}$ inch and possibly

Grain structure of brass is suitable for stamping because the surface of the metal is stretched does not be-

Continued on Following Page, Column 2

MODIFICATIONS IN PHYSICAL PROPERTIES SIMPLIFY BRASS FABRICATION PROCESSES

Study of Problem by Supplier's Metallurgists May Reveal Opportunities for Cost Reduction or Product Improvement

The term "brass" covers such a remarkably wide range of alloys (composed of various proportions of copper and zinc) so different in appearance and physical properties, so easily workable, inexpensive and corrosion resisting, that it is no wonder that brass, one of the oldest alloys to be used by civilized man, is probably employed for more different items than any other alloy or metal.

The physical properties of each alloy can be radically modified by:

- (1) Changing the composition.
 - (a) Modifying the proportions of copper and zinc.
 - (b) Additions of small amounts of lead, tin, aluminum, iron, arsenic, etc.
- (2) Changing the temper, viz. ductility, hardness, strength, etc.
 - (a) Heat treatment to produce various gradations of softness and ductility.
 - (b) Cold working (reduction by rolling or drawing without subsequent annealing) to produce various gradations of hardness and stiffness.

Since the metallurgical laboratories of the brass supplier study the applications of alloys as well as their physical properties, they are in an excellent position to assist the manufacturer of metal goods by offering him technical information and advice in the solution of fabricating problems. In many cases the supplier's laboratory has been able to suggest a modification in physical properties which results in lower product cost or higher quality.

Typical Cases of Metallurgical Assistance

The following examples are typical of the assistance given to fabricators by the Bridgeport Metallurgical Laboratory, which provides this consulting service at no cost to Bridgeport customers.

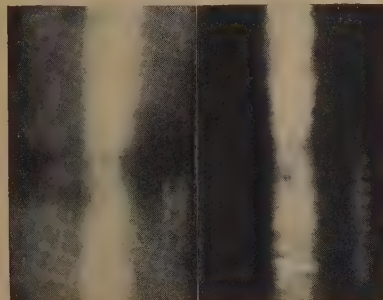
A manufacturer had been using brass sheet, which contained a small amount of lead, for making razor guards which had to be blanked, milled, and cold worked. He complained that his milling operation was giving him trouble. The Laboratory's problem was to supply an alloy which would be so balanced that all of the three operations could be performed satisfactorily. The Laboratory recommended a brass with a higher lead content, with the result that a cleaner blank (more free from burrs) was obtained and the milling operation was improved. At the same time, the material was malleable enough so that the

(Continued on Following Page, Column 1)

Floating Copper Shot Makes X-Rays Sharper

Particles of copper so fine they float on water without breaking the surface tension help the scientists of General Electric Company to obtain sharp X-ray pictures of metal objects with irregular outlines. Because X-rays are absorbed unequally by air and metal, some parts of the conventional picture are blurred. When the copper shot is used, the background of the picture is sharply blocked out.

The spherical particles used are so small that ten million of them fit in a volume of one cubic inch. To make the X-ray picture, the shot is simply poured over the object to be photographed.



Left: Ripples in this radiograph of a weld obscure internal defects. Right: Ripples and "fuzziness" are eliminated by use of copper shot.

COPPER ALLOY BULLETIN

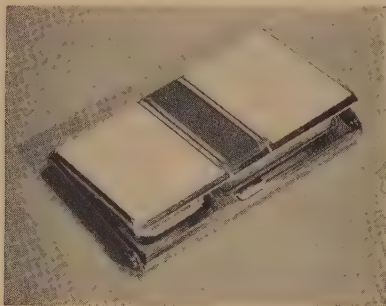
PHYSICAL PROPERTIES

(Continued from Preceding Page, Column 3)

necessary cold stamping operation could be performed.

Savings in finishing costs can often be effected by simply changing the temper of the brass. For example: A manufacturer of chromium-plated brass soap dishes and tumbler holders was able to cut down his polishing and buffing costs when he was provided with brass that had been annealed to produce a very fine, uniform grain structure. He had been using brass rolled 1 # (B & S) hard, which was much coarser in grain structure. When he changed to the fine grained material, he not only reduced his finishing costs but he also improved his quality.

For the manufacture of vanity cases and metal boxes, special care must be taken to supply brass suitable for this class of work. Here, inexpensive items must compete with expensive gold-filled, silver and real gold articles in appearance and workmanship. Certain compositions of brass are a perfect match for solid gold in color except that the finish of the brass must be retained by a good clear lacquer protection. For certain classes of work, the finished vanity case, for example, is given a matte dip (strong acid attack), producing a dull, frosted finish which is apt to reveal and



Control of finish in brass for vanity cases eliminates extra operations in securing brilliant finish and attractive appearance. Special alloys can be supplied to match gold in color.

emphasize any scratches or blemishes which may exist on the surface of the brass. In order to keep the finishing costs down, the brass mill must supply material with an

exceptionally fine, clean surface and accurate in composition. At the same time, the grain structure of the brass must be carefully controlled so that operations such as polishing and buffing can be kept down to the minimum.

By "dry rolling," a brass manufacturer is able to produce brass or copper with a polished finish which is much higher in lustre than is found on brass rolled in the regular manner. For some purposes, such as linoleum stripping, picture frames, etc., this brighter finished material is very desirable. However, close examination of the surface reveals the presence of a series of fine scratches which had been produced by the burnishing action of the rolls. A manufacturer of brass initials for decorative purposes had been using dry rolled brass and complained that the minute scratches seemed to be more prominent after the material had been blanked. The Laboratory recommended brass with a fine grain but rolled 3 numbers (B & S) hard. The resulting material was not as high in lustre as the dry rolled metal, but was much more uniform and satisfactory on the finished job.

Since manufacturing methods are being speeded up by the use of more powerful equipment and machines designed for progressive operations, manufacturers of metal items can profit by progress in modern metallurgy. They will find the specialized experience of the Metallurgical Laboratory a great advantage in meeting difficult engineering requirements and severe service conditions.

GRAIN SIZE

(Continued from Preceding Page, Column 1)

come rough. Such material can be readily buffed and colored. If the grain structure is coarse, stretching and bending operations produce a rough surface on the brass which must be ground off if the material is to receive a highly polished finish. A medium grain size is recommended for severe cupping and drawing operations on heavier gages of metal, especially when the side walls are "pinched" during the drawing operation. Since roughness is in proportion to the size of the grain, the tendency is to keep the grain size down to the minimum consistent with the physical properties required and the operations involved.

NEW DEVELOPMENTS

This column lists items developed by many different sources, information on any of these can be obtained by writing the Bridgeport Brass Company, which will gladly refer you to the manufacturer or other source.

Hole saws are made in a range of sizes from $\frac{1}{8}$ -inch to $3\frac{1}{2}$ inches in diameter. They are made in one piece of high speed steel, in order to produce a tool that will retain its cutting edge for a long period of time.

A marking machine is suitable for marking cylindrical or conical pieces, such as ferrules, rings, etc. Machine is hand-operated, and marks up to $1\frac{1}{4}$ inches long. The work is rotated during the marking of the entire circumference can be provided it falls within the $1\frac{1}{4}$ -inch limit.

A new anode for chromium plating consists of a thin film of lead bonded to a type frame of copper to form a grid which lead is built up to the desired thickness to complete the anode. Treatment with a burning flame is said to remove the coating, preventing the plating from penetrating to the copper.

A buffing and polishing machine is provided with a device that automatically changes composition to the buffing wheel is adjustable to handle varying amounts of pressure. It is operated by compressed air through a valve timed to correspond with the rotation of the buffing machine conveyor.

A syphon breaker, built into a tank, is said to operate to force a clean water into the cleansing tanks during operations. Breaker is built on the principle. Water and air enter at the bottom of the tank, and are forced up and washed from the material being cleaned off at the top of the tank. It is said to allow the admittance of air and water, and allows the use of a smaller quantity of water than is normally required.

A fabricating machine is designed to handle a wide variety of sheet metal. It is a simplified unit designed to perform shear, flange, or both. As a shear, it cuts all straight and irregular cutting curves. A change of heads converts the machine into a flanger. Shoulder of the rolls acts as a guide for the depth of the flange. Machine is arranged for two different flanging speeds.

A new retarder is said to be effective in preventing "blushing" of nitrocellulose lacquers during the drying process in humid weather. Laboratory tests are said to show that the use of the retarder increases drying time to an undue extent. Retarder has wide resin tolerance, nitrocellulose solvency, and is suitable for use with most lacquers.

PRODUCTS OF THE BRIDGEPORT BRASS COMPANY

Executive Offices: BRIDGEPORT, CONN.—Branch Offices and Warehouses in Principal Cities

SHEETS, ROLLS, STRIPS—Brass, bronze, copper, Duralumin,* for stamping, deep drawing, forming and spinning.

CONDENSER, HEAT EXCHANGER, SUGAR TUBES—For steam surface condensers, heat exchangers; oil refineries, and process industries.

PHONO-ELECTRIC* ALLOYS—High-strength bronze trolley, messenger wire and cable.

WELDING ROD—For repairing cast iron and steel, fabricating silicon bronze tanks.

LEDRITE* ROD—For making automatic screw machine products.

COPPER WATER TUBE AND FITTINGS—For plumbing, heating, underground piping.

DURONZE ALLOYS—High-strength silicon bronzes for corrosion-resistant connectors, marine hardware; hot rolled sheets for tanks, boilers, heaters, flues, ducts, flashings.

BRASS, BRONZE, DURALUMIN*—For cap and nut, wood screws, rivets, bolts.

FABRICATING SERVICE—Engineering staff, special tooling for making parts or components.

BRASS AND COPPER—"Plumrite"® for plumbing, ground and industrial service.

*Trade-name.

Established 1865

BRIDGEPORT BRASS

well machine to read inch. A 50-kilogram to give necessary A complete hardness is made of the face of the weld. It was hardness readings from the weld to the parent good indication of the characteristics of weld. In the case, the peened

peened and unpeened welds after quenching were substantially equal. With the exception of the SAE 2315 weld, the core hardness of the weld was lower than that of the parent metal. The peened and unpeened SAE 2315 welds had identical high hardnesses, indicating that the particular analysis undoubtedly absorbed some hardening element such as nitrogen, etc., during the weld

ferent and sharply defined, even for the rod of the same analysis. Second, in the carburized weld metals, a large percentage of hypereutectoid zone was formed whereas there was little, if any, hypereutectoid zone in the parent metal.

The sharply defined boundary between the different structures is illustrated in Fig. 1 for the SAE 2315 weld rod. Dark portion is the ferrite of the parent metal. Carbon has penetrated considerably deeper into the weld metal. The void shown is typical of the porous structure resulting with this rod. The same boundary and structural differences for the straight carbon rod is shown in Fig. 3. In this case carbon has penetrated deeper into the parent metal. It would seem that the carbon prefers to penetrate through the parent metal by a longer path rather than penetrate through the junction.

The great difference in the structures of the outer case, especially of the formation of the hypereutectoid structure is illustrated by Fig. 4. All the rods showed this characteristic. Formation of a hypereutectoid zone is to be avoided because such a case, although extremely hard, also is brittle and susceptible to the development of cracks and grinding checks. As an average, the parent SAE 2315 metal had a

(Please turn to Page 75)

Fig. 4. (Just below)—Produced by carbon molybdenum rod, showing outer case structure at 100 diameters. Fig. 5. (At bottom)—Core structure produced by carbon molybdenum rod

TABLE I—CASE DEPTHS

Condition	Depth of Case in Weld	Depth of Case in Parent Metal SAE 2315	Difference
Peened	0.063 In.	0.075 In.	0.012 In.
Not Peened	0.073 "	0.080 "	0.007 "
Peened	0.100 "	0.070 "	0.030 "
Not Peened	0.104 "	0.075 "	0.029 "
Peened	0.058 "	0.075 "	0.017 "
Not Peened	0.060 "	0.075 "	0.015 "
Peened	0.060 "	0.075 "	0.015 "
Not Peened	0.062 "	0.080 "	0.018 "

a slightly higher the unpeened welds, not being sufficiently ant the general adop- g. There is but slight hardness between the ction" and the "face" The alloy rods produce matches the parent rdness for most prac- s. The straight car- d not be suitable be- lting case hardness is

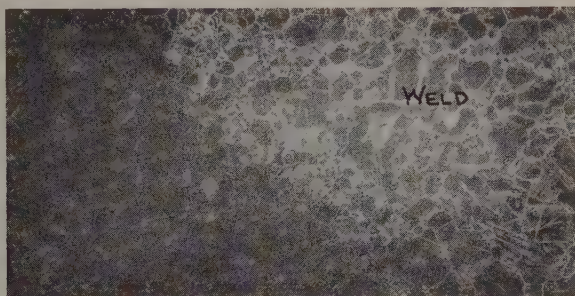
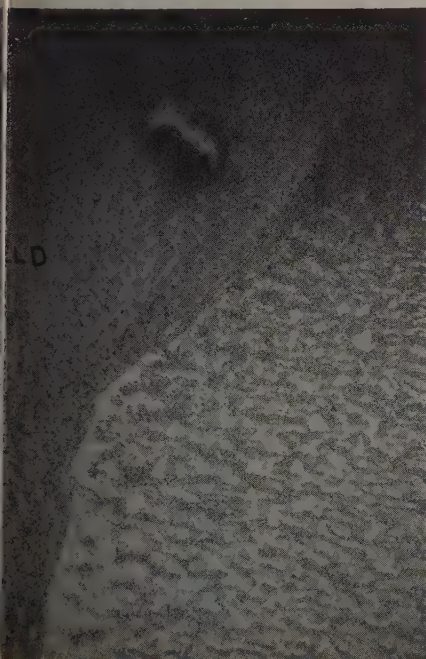
the hardness of the

process. The variations in core hardness are within commercial limits and will not affect the operation of the welded and carburized structures except for the SAE 2315 rods. Experience shows SAE 2315 rod has doubtful merits for case carburizing applications when welded by standard practices.

Hypereutectoid Zone Formed

A microscopic examination of the carburized welds revealed structures which ordinarily would not be suspected of existing. First, it was evident that the carburized microscopic structures on both sides of the junction of the weld were entirely dif-

are produced by SAE at 50 diameters





Experimental Open Hec

Intermediate size unit bridges gap between laboratory and mill. Series of tests shows furnace makes steel comparable with that produced in mill furnaces, thus assuring that results of experimental work can be applied successfully to large production units

By **DR. H. K. WORK**
Manager Research Division
and

M. H. BANTA
Research Engineer
Jones & Laughlin Steel Corp.
Pittsburgh

■ IT IS difficult to take research laboratory developments and place them directly into the mill. Attempts to do this generally result in a high percentage of failure. On the other hand, studies in the mill must be restricted to conditions which will permit a commercially favorable product; otherwise the

costs are excessive. To bridge the gap between laboratory and mill, a pilot or experimental open hearth was recently constructed by Development division of Jones & Laughlin Steel Corp., Pittsburgh.

Desired size of experimental open-hearth furnace first appeared to be 1000 pounds. Below this size, heat losses become disproportionately large, and it is difficult to adjust the flame properly. Also, since it was desired to make rimming as well as killed heats in the furnace, it was decided to make the furnace large enough to supply at least a

Abstract from paper prepared for Open Hearth and Blast Furnace Conference, held in Cleveland, April 26, 27 and 28, 1939.

1000-pound ingot for rimming purposes. For these reasons, capacity was tentatively 1000 pounds. This later was reduced to 50 per cent.

In small regenerative furnaces previously built, the line had to be scaled down from large ones except for some details and narrowing of the hearth itself. Such hearth design factor limiting minimum

Influence of firing method on hearth lines is even more pronounced in small furnaces than in large ones. Scaling down burners of a large furnace for assurance of success in a small furnace. Accordingly, but designed capable of supplying necessary heat from a small burner design, local hearth lines adjusted on the other to give best appearance. In this furnace, the hearth is approximately circular as defined by three burners. The circular hearth and roughly spherical space efficiently use heat supply, are easy to maintain, and are convenient work with in melting.

This 3-burner arrangement, however, was poorly adapted to design of regenerative furnace since it is well suited to a fired furnace, it appeared desirable to build such a furnace equip it with a recuperative latter unit uses carborundum having high heat conduct

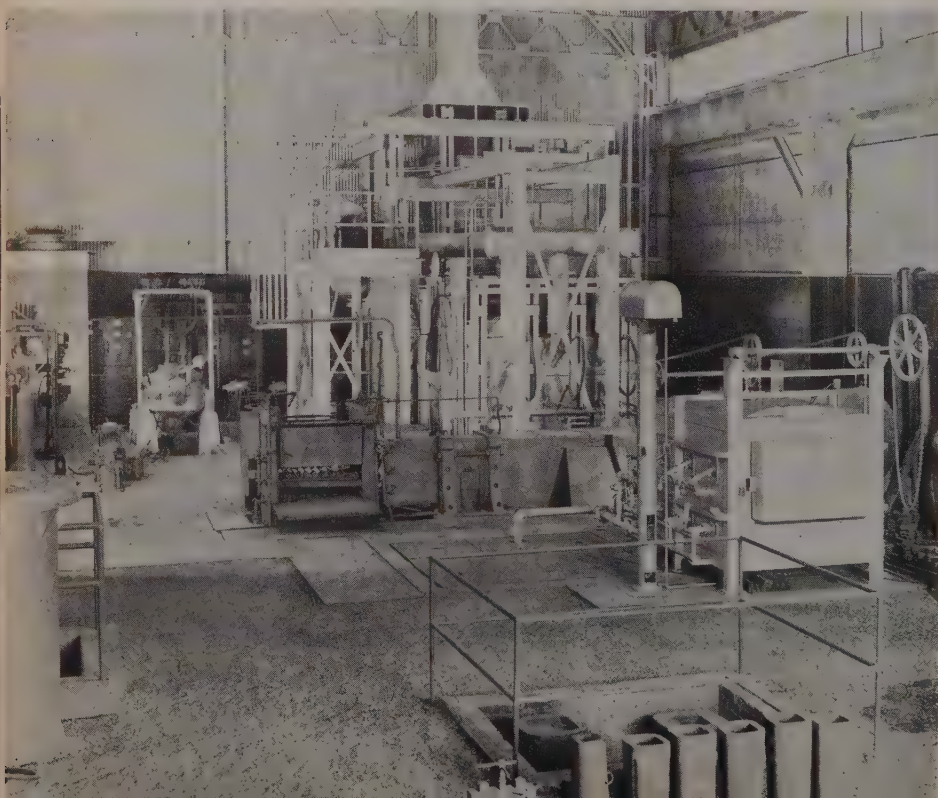


Fig. 1—Pilot plant open hearth charging platform at left and tapping pit on the right. In the teeming pit with two 1000 lb. got molds in place in pit and small molds in front of



A BETTER JOB IN $\frac{1}{10}$ THE TIME



Just off the press—**AIRCO'S** New Flame Descaling and Flame Cleaning and Dehydrating booklet. Get your copy now.

Scale and rust was removed from the surface of this ship, under construction, by the **AIRCO** Flame Cleaning Process before painting. The former method of cleaning the steel surface was by hand cleaning by which a man averaged 240 sq. ft. per 8-hour day. Using **AIRCO** Flame Cleaning and an efficiency figure of 5 hours production out of an 8-hour day, one man averaged 3000 sq. ft. » » » Furthermore, **AIRCO** Flame Cleaning removes much of the scale that would not be removed by the hand wire brush method. » » » More and more, **AIRCO** Flame Cleaning is being recognized as a superior method of preparing fabricated structure for shop painting.

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Anything and Everything for GAS and ELECTRIC ARC WELDING and GAS CUTTING



TABLE I

	Size	Grade
7" x 29" x 42"	Slab	Trimming
11" x 11" x 39"	Big-end-up, hot-topped	Killed
11" x 11" x 39"	Open top	Trimming or semi-killed
6" x 6" x 24"	Open top	Killed or semi-killed

arranged as shown in Fig. 2. This unit efficiently preheats air for the furnace.

Furnace dimensions are as follows: Bath at slag line is square, about 4½ feet on a side, with a dish-shaped bottom having a maximum depth of 1 foot. Bottom is magnesite, fused into a minimum depth of 6 inches on 6 inches of magnesite brick. Silica brick roof is arched from front to back on a 4-foot radius over a 6-foot 9-inch span. Maximum height of arch over bottom is 4 feet 5 inches. Tap hole is 6 inches in diameter. Charging door is 18 inches square. Furnace as actually constructed has been found large enough to accommodate a 2700-pound heat.

Between the exhaust port and the recuperator is a slag pocket 6 feet 9 inches long and 21 inches below the bottom of the exhaust port. This prevents ferrous oxide from being carried over from the bath to the recuperator. Clean-out door in slag pocket is about 18 inches square.

Recuperator, Fig. 2, employs two horizontal banks, each with 18 carborundum tubes equipped with core-

busters. Tubes are 4 feet 4 inches long, 6 inches in diameter with a 1-inch wall. Exhaust gases flow upward around outside of tubes and escape through an 18-inch stack.

Air is drawn into front end of upper bank of tubes through a chamber in the back and passes out of the lower tube bank in the opposite direction. In normal operation, air is heated to 1200 degrees Fahr. and conducted through a well insulated pipe, 12½ inches in diameter, to a cross header above the three burners fed by separate 7-inch pipes.

Burning in the bottom required four days and 3550 pounds of Washington magnesite mixed with 16 per cent ground basic slag, giving a thickness of 6 inches in front of tap hole. Magnesite is used as required for patching.

Typical furnace charge consists of 50 per cent cold pig and 10 per cent stone. Billets from heats of open-hearth or Bessemer steel, identified by heat numbers, are used as scrap, so complete information concerning raw materials used may be at hand. Melting down the charge requires about 2½ hours. Usual duration of working period is about 1½ hours.

Reaction rates are such that removal of metalloids proceeds some-

Fig. 2—Two sections through recuperator unit showing arrangement of carborundum tubes

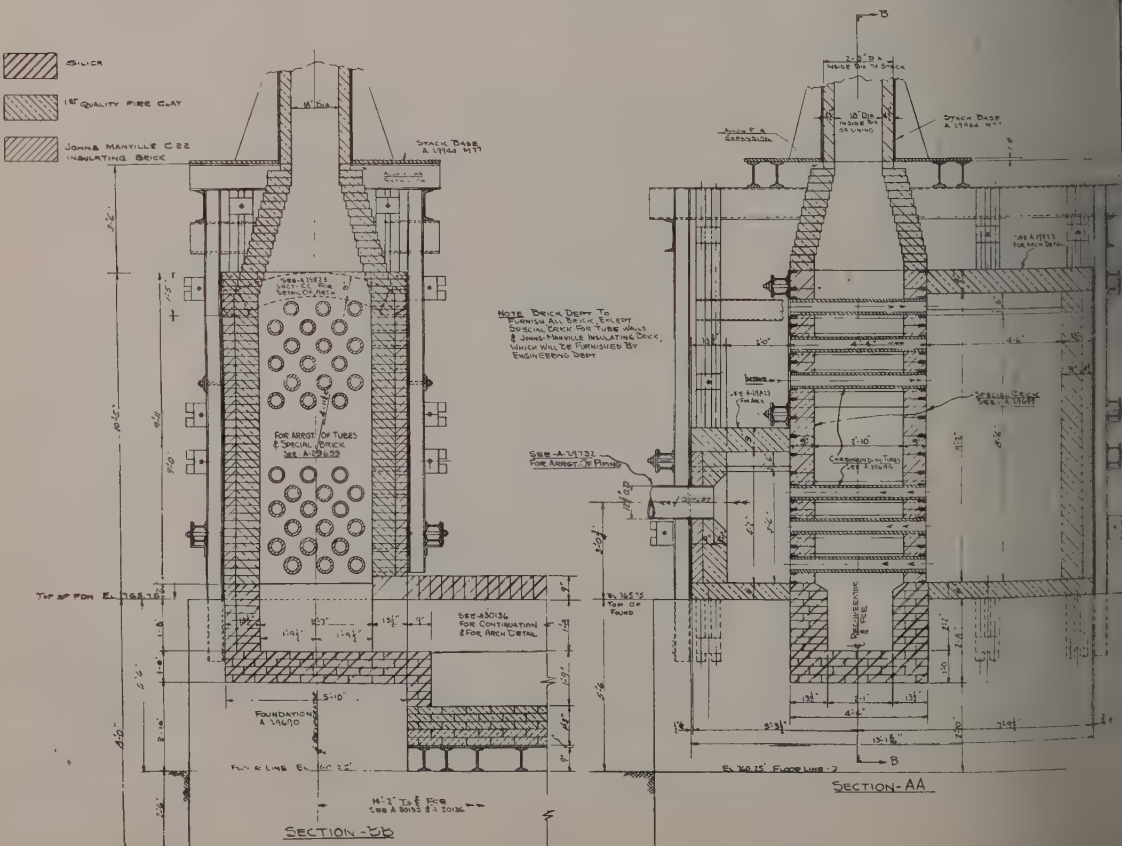
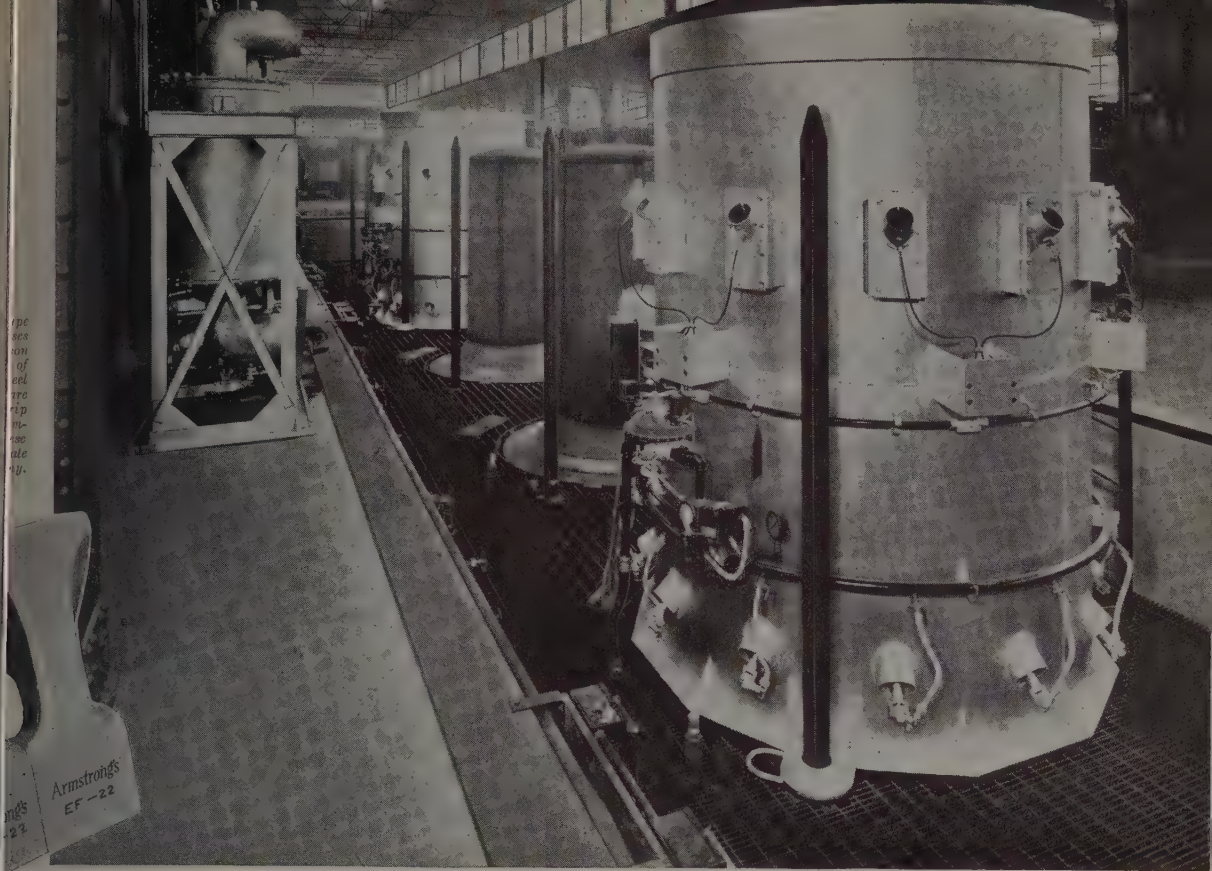


Fig. 3—Tapping a heat tre
perimental open hec

what faster than in large due to the bath being shallow, increasing ratio metal interface to unit metal bath.

It is general practice to
in the furnace whenever
Furnace deoxidation is
desirable since heavy li-
tions have a decided chill
upon such a small heat.
a fast tap, a 6-inch dia
hole is used, closed with
faced off with double-bu

(Please turn to Page



LEE WILSON ANNEALING FURNACES

use ARMSTRONG'S BRICK for better heat control



SHOWN on this page are several installations of cylindrical bell type furnaces and bases,

built by Lee Wilson Engineering Company, of Cleveland, Ohio. Armstrong's Insulating Fire Brick in each of these jobs aid fast, efficient operation and uniform temperature control.

There are several reasons why this insulating material is selected by leading furnace builders. The use of Armstrong's Brick assures lower fuel costs, more accurate temperature control, and a faster operating cycle. In many types of furnaces, these brick permit thinner furnace

walls and larger hearth areas. Their light weight offers many construction advantages which combine with space savings to aid investment reduction.

Armstrong's Insulating Fire Brick can be shaped as desired because they are strong and have a uniform, workable texture. The special shape shown fits accurately around tube inlets and outlets in the Wilson furnaces.

Let us send you full details of Armstrong's High Temperature Insulation. Write today for samples and prices to Armstrong Cork Co., Building Materials Division, 985 Concord Street, Lancaster, Pennsylvania.



Armstrong's

HIGH TEMPERATURE INSULATION

INSULATING FIRE BRICK
HIGH TEMPERATURE BLOCK

PLASTIC CEMENTS
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For Superior Steel Corporation includes low carbon strip coil bright annealing.

New Brighton, Pa., Lee Wilson built bases for low carbon wire annealing.



Metals Assume Important Part in High-Speed Transportation Units

■ **ENGINEERING** problems involved in the use of materials to reduce weight were considered at one session of the World Automotive congress in New York, May 22-26 (STEEL, May 29, p. 64). Two papers bearing on this general subject were presented at a truck, bus and railcar session. Col. E. J. W. Ragsdale, Edward G. Budd Mfg. Co., Philadelphia, confined his attention to low-alloy and stainless steels; Frank Jardine, Aluminum Co. of America, New Kensington, Pa., dealt with aluminum and its alloys.

Weight, which does not necessarily mean strength, is a continued economic burden to anything that moves; thus the increasing employment of special alloy steels in engineering, said Col. Ragsdale. In the use of ferrous metals the aviation industry has taught an appreciation of structural values in the reduction of weight with retention of strength, actually increasing tensile strength by the adoption of alloy steels. Aviation has demonstrated that pound costs are about the same whether payload or vehicle load and as a result engineers have become weight conscious as well as streamline minded.

Stability Is Important

Light-weight construction was defined by Col. Ragsdale as the superior use of superior material, declaring that stability is the keynote of all light-weight fabrication. To stability must be added resistance to corrosion and in the case of closed sections which cannot be painted, corrosion resistance is almost imperative. Practically all types of alloy steels offered for light-weight construction claim corrosion resistance.

In the former a protective coating of tenacious rust is quickly formed, a rust which does not flake off as readily as that formed on mild steel, resulting in a longer length of service, four to six times longer. Col. Ragsdale declared the choice between the low alloy group and stainless often is a matter of economics.

Advantages claimed for stainless included strength, notably by annealing and cold rolling; resistance to elevated temperatures, at 1000 degrees Fahr. retaining 60 per cent of its strength; high fatigue endurance limit, 79,000 pounds per square inch, as compared with 25,000 pounds for mild steel; and impact resistance at lower temperatures. Also, according to Col. Ragsdale, 18-8 stainless is the only structural metal which can actually be tough-

ened by welding and which requires no subsequent correction through annealing. This is not true of all forms of welding, but applies to the shotweld system, he explained.

Where no great weight reduction is required, and where the economics of the project do not justify a more expensive material, low alloys serve a useful purpose. Because they possess tensile strengths some 30 per cent greater than that of mild steel there can be an almost equivalent saving of metal and because they have a somewhat superior corrosion resistance, there is little increased liability to corrosive attack through the use of thinner gages.

Since light-weight construction involves more fabrication than does a conventional structure, that fabrication must be made as simple and as economical as possible. The shotweld process provides inexpensive assembly, Col. Ragsdale declared.

General tendency to increase speed of all forms of transportation with a reduction in operation costs has had a profound influence on the use of nonferrous metals, notably aluminum in the construction of buses, according to Mr. Jardine. He stressed the high tensile strength of aluminum and its advantages of light weight. The advent of air conditioning in intercity type buses has placed an additional premium on light-weight design. Equipment required has increased the weight of the vehicle, and, according to Mr. Jardine, bus designers are now working to keep air conditioning equipment as light as possible and attempting to reduce the weight of the remainder of the bus to compensate. Use of aluminum for window sash, doors, interior finish, rear axle housing and wheels and its advantages as a saver of weight, was pointed out.

Models Aid in Weld Design

■ **COMPLETION** in England of successful tests of an all-welded model of a plate girder which will contribute to a better understanding of many engineering problems encountered in building the full-size all-welded structures employed in skyscrapers, bridges, ships and houses, is reported by the welding research committee of the Engineering Foundation, New York.

Cost of experimenting with models weighing less than 60 pounds is but a fraction of that entailed in using

the ordinary girder weighing more than 7000 pounds. It is making it possible to test a wider variety of design methods of fabrication. The results of such studies will lead to a more economical and safer construction, report declares.

Data obtained from the tests is extremely important, pointed out, because of the demand for all-welded prefabricated houses, bridges, shipbuilding and other forms of construction.

In the shipbuilding industry, for example, statistics compiled by the American Bureau of Shipping show that 138 of the 155 vessels built in 1930 were all-welded. Of the nearly 300 feet constructed in all-welded. In recent years, including 18,000 tons, have been all-welded.

The model used in the tests weighed 58 pounds, or 1/100th as its prototype. It was made of 14-gage steel and was 14 inches long with a depth of 1.5 inches. Most important tests from the point of view of the building industry was the fact that the model released in a considerable amount of residual strains and stresses. Directly-designed all-welded structures, according to

Girders Withstand Load

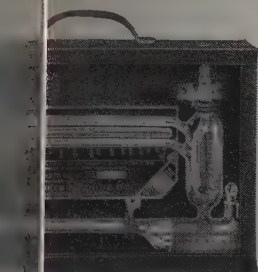
Engineers have long been doubtful of all-welded girders, it is pointed out, because of the strains and stresses introduced into the girders themselves by the welding process. The tests have revealed that as far as the strength of the girders were concerned, their fears were relieved these inner stresses.

"By means of electrical fusion, welding, maintenance of geometrical similarity between models and full-sized structures is greatly facilitated, particularly in the case of thin-gage metal has been successfully mastered, the results of the tests are

"Models made by this process are particularly apt and useful in the study of the welding procedure, resulting strains and stresses, and the effect of the finished product under determined loads may be

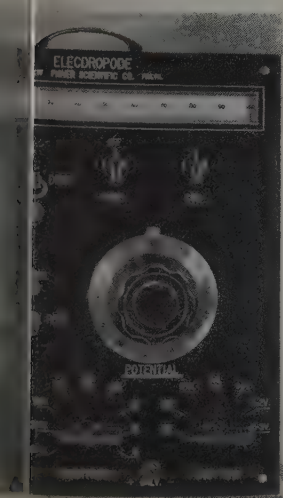
"Tests with the model proved that the correct welding procedure is applicable to electric arc welding of structures of all sizes and shapes. The mechanical engineering studies quickly at small scale, enabling a more intensive study of research pointed toward more economical and safer structures."

Machine Co., Tabor
Ohio, has developed a
vacuum McLeod type
over pressures from
and will not spill
single reading is tak-
seconds and continuous
made in rapid succes-
(less than 10 seconds each).
in microns on center
it weighs 4½ pounds
and measures 7 x 11



tubing is of extra-heavy
annealed to remove in-
ter. No hammering ac-
curacy is possible at any

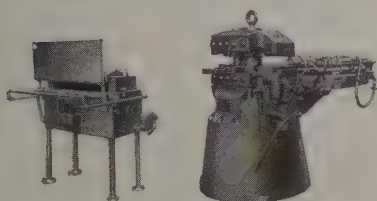
Scientific Co., 711 Forbes St., Pittsburgh, has developed the method for qualitative and quantitative analyses in both organic and inorganic chemistry. Its method is based on two facts: (1) a dropping mercury electrode is used in solution makes known by a current indicating that takes place at a definite potential and there is a definite relationship between the amount of current and the amount of ion cause a current increase. Unit has been used for determination of copper, cadmium in commercial samples, nickel and cobalt. Only a small amount



Furnace And Sharpener

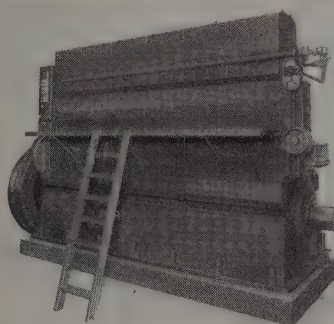
■ Ingersoll-Rand Co., Phillipsburg, N. J., offers its 27F oil furnace and IR54 drill steel sharpener. Furnace is equipped with flame blower, heat deflector and preheating chamber through which low-pressure air passes before entering burner. Hearth opening is 3 x 27½ inches, over-all dimensions are 38 x 46 x 54 inches, air consumption is 10 to 20 cubic feet per minute, oil consumption is 2 to 4 gallons per hour. Furnace is recommended for use with IR54 sharpener.

Dies are secured in place by



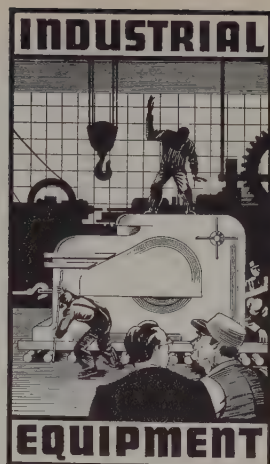
through-bolts tightened from front on sharpener. Air receiver and exhaust muffling chamber are incorporated. Blow heads remove all scale. Hinged-type safety block can be tipped into position without danger of getting hand into cross head. Air pressure required for most efficient work is 70-100 pounds per square inch.

■ **Worthington Pump & Machinery Corp., Harrison, N. J.**, offers its type CC totally-enclosed 4-cycle trunk-piston Diesel engine. Provision for



expansion is made in cone-type cylinder head and no gasket is needed between cylinder head and liner. All moving parts are pressure-lubricated, and cylinder walls have positive sight-feed lubrication.

■ The L. S. Starrett Co., Athol, Mass., has gages No. 829 for meas-



uring small holes and internal dimensions less than those ordinarily handled with telescoping gages. They are available in sets of four gages covering ranges $\frac{1}{8}$ to $\frac{1}{2}$ -inch. End of each gage is in form of a split ball which is expanded by a cone controlled by knurled knob at



end of handle. Ball is placed in hole, expanded to get the "feel" and measurement transferred to a micrometer.

■ **Forbes & Myers, Worcester, Mass.**, has developed a frequency changer for testing 25 cycle apparatus. Built as a single unit, it makes available 110, 220, 440 volts at 25 cycles from 60 cycle line.

■ Gisholt Machine Co., Madison, Wis., has improved its 1L and 2L turret lathes and added the 3L model. Bar capacities range from 2½ to 4½-inch diameter and from 36



to 48 inches in length. Swing over ways is from 19 to 26 inches and chucks are from 12 to 21-inch diameter. Headstocks have 12 spindle speeds arranged in geometrical progression ranging on 1L and 2L machines from 20 to 486 revolutions per minute and on 3L from 12 to 333 revolutions per minute. Direct reading speed plate is mounted on headstock. Both longitudinal and cross feeds of cross slide have sixteen reversible power feeds in two ranges of eight. Longitudinal feeds range from .004 to .136 and cross feeds from .002 to .068 and 1L and .002 to .084-inch on 2L and 3L machines. Built-in taper attachment is available for cross slide and is provided with standard guide plate for cutting tapers up to 1½ inches per foot and 12 inches maximum length.

Demagnetizer

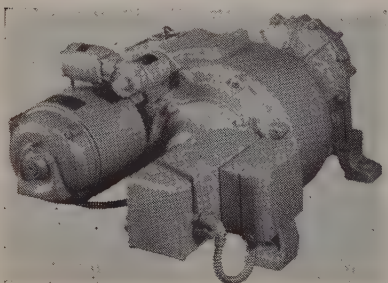
■ The Blanchard Machine Co., Cambridge, Mass., has a demagnetizer adjustable for gaps from 1 to 6 inches which produces an intense alternating magnetic field between poles to demagnetize articles which are placed in gap and slowly with-



drawn. Heavy high-speed steel tools are completely demagnetized in a few seconds. Several hundred small pieces held in a wire basket can be demagnetized at once, the entire operation requiring less than half a minute.

Automatic Speed Control

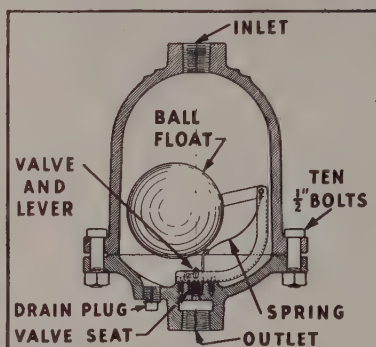
■ Sterling Electric Motors, Telegraph Road at Atlantic boulevard, Los Angeles, has developed a 3-



horsepower speed control. Unit gives output shaft speeds of 60 to 15 revolutions per minute, arranged with electric automatic control. Speed of output shaft is governed by position of small lever on control box. Lever travels through an arc of approximately 60 degrees for complete speed range and is provided with over-travel to prevent damage to switch mechanism. All electrical contacts in entire system are quick break and completely enclosed. Units are available in various ratings up to 15 horsepower with all standard gear ratios and motors completely enclosed.

Snap-Action Air Trap

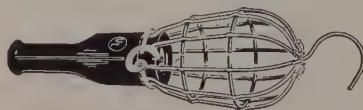
■ Armstrong Machine Works, Three Rivers, Mich., has announced an automatic "snap-action" mechanical trap with positive opening and closing of discharge valve and freedom from need of priming for draining



water from compressed air lines without loss of air. Ball float is connected to short valve lever through a flat strip of stainless spring steel which is bowed downward in closed position. As water enters trap, float rises bending spring. Just before float reaches top of trap, spring bends past dead-center, bows upward and snaps valve wide open. As water level drops in trap, cycle is reversed and valve snaps shut. Capacity is 1400 pounds of water per hour at 125 pounds and 1000 pounds per hour at 250 pounds pressure.

Lamp Guard

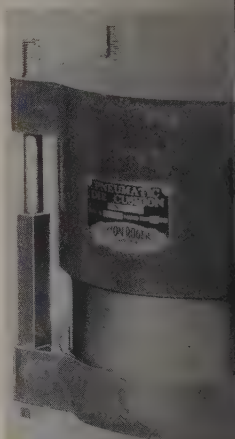
■ McGill Mfg. Co., Valparaiso, Ind., has introduced No. 7100 series of portable guards having a cage constructed of ten extra-heavy steel



wires electrically welded and cadmium plated. Unit will not roll when laid down and is fastened to handle by a cam arrangement which enables changing lamp without tools.

Pneumatic Die

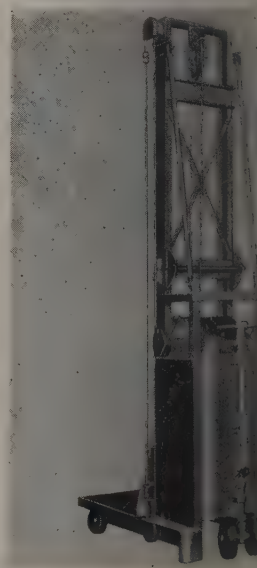
■ The Dayton Rogers Thirteenth avenue So. olis, offers "C" pneu ions in six sizes havin eters from 6 inches



progressing by 2 inch ing capacity from 3 inches. No surge tank sary in drawing shells of 1½ inches. When needed, air in cylinder allowing pin plate to to bottom of its maxim capacity. Pneumatic re gage maintains predete stant pressure on cylind

Stacker Control

■ The Lewis-Shepard Watertown, Mass., has new type stacker opera which allows operator to chine from either side. stackers, control is s as cable is automatica and taken up by long sp





SEE WHAT "FRAX" CEMENTS CAN DO IN YOUR MULTIPLE BURNER FURNACES

question of burner maintenance and repair becomes increasingly important in steel and creating plants with the increasing use of furnaces utilizing a multiplicity of burner tunnels and a large number of burner blocks to be kept in operating condition. Necessary the use of a refractory particularly suited to the conditions of service, if excessive maintenance costs are to be eliminated and possible furnace shutdowns minimized. The "Frax" group of burner cements, comprised of "Carbofrax"

(silicon carbide) "Alfrax" (fused alumina) "Mullfrax" (electric furnace mullite) and "Mullfrax" S (sillimanite), assure low maintenance cost and satisfactory service from your burner equipment because they have been developed specifically for this purpose, are easily installed and are extremely refractory.

Selection of the proper cement for your particular conditions can be made by our factory representative at our nearest office. Why not ask him to call for a discussion of your problem.



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REG. U. S. PAT. OFF.
Offices: Boston, Chicago, Cleveland, Detroit, Philadelphia, Pittsburgh. Agents: McConnell Sales and Engineering Corp., Birmingham, Ala.; Christy Fire Brick Co., Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Co., Los Angeles, San Francisco, Seattle; Denver Fireclay Co., El Paso, Texas; Refractory Products Co., Chicago-Detroit.

(Carborundum, Frax, Carbofrax, Alfrax, Mullfrax and Mullfrax S are registered trade-marks of The Carborundum Company)

controller handle, eliminating problem of loosening hoisting cable when letting down top section.

Battery Charger

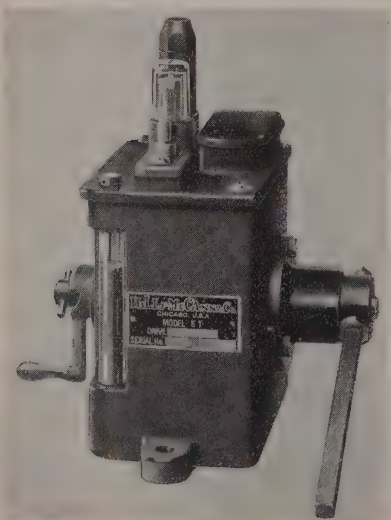
■ General Electric Co., Schenectady, N. Y., has announced Phano-Charger, a self-regulating electronic battery charger having no moving parts and available in 4.5 and 12.5 amperes to operate from single-phase power supply and 25 amperes for 3-phase AC supply. Adjustable over a wide voltage range, it will trickle-charge a fully charged bat-



tery. Voltage characteristic is flat from no load to full load and then breaks abruptly into a relatively constant-current characteristic. Regulation is maintained within plus or minus 1 per cent from no load to full load and for a variation of plus or minus 5 per cent in line voltage. Saturable reactor provides close regulation and protection for tubes.

Lubricator

■ Hills-McCanna Co., 2349 Nelson street, Chicago, has announced a force-feed lubricator, in four types ranging from 1 to 60 feeds, which delivers a fraction of a drop of oil



to 10 drops per stroke at 2000 pounds per square inch. Lucite built-in sight feed is never under pressure.

Electric Hoist

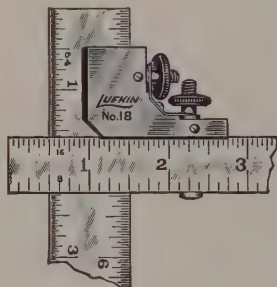
■ Coffing Hoist Co., Danville, Ill., has announced Quik-Lift electric hoist in capacities from 250 to 4000



pounds. Unit weighs 89 to 195 pounds and has lubri-sealed ball bearings, gears and pinions sealed and running in oil, drop forge hooks designed to stand 200 per cent overload, load chain that will not kink or bend, shoe type brake and either load hook or trolley suspension.

Rule Clamp

■ Lufkin Rule Co., Saginaw, Mich., has marketed a rule clamp for holding at right angles a combination-square blade and any steel rule not over one inch wide. Clamp also can



be applied to thin steel squares. Clip holds both clamp nuts in place and prevents their interfering with each other. Thumb nuts are knurled.

Face Shields

■ American Optical Co., Southbridge, Mass., has designed face shields for light duty work. Shield may be thrown up when not in use, and friction joint at adjustable headband holds it firmly in either "on guard" or "off" position. Windows are clear, amber, or green and aluminum binding strip gives them

rigidity, yet permits Shields may be worn without prescription glasses.

Master Switch

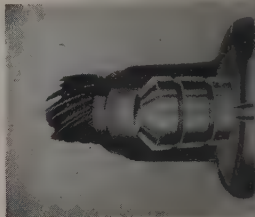
■ Westinghouse Electric Co., E. Pittsburgh, Pa., has announced a heavy-duty master switch



and crane controllers. definite "feel" of operation is provided for either foot operation, for vertical or horizontal mounting. Grounding is facilitated by a cover that can be removed vertically. Operation results from a spring-closed arrangement eliminates any possibility of contacts remaining closed where they should be open.

Rail Bond

■ A rail bond for bonding joint plates and for closing gaps has been announced by



Co., Mansfield, O. Bond, is of standard stud terminal except terminal is slotted to permit insertion of steel pin. Terminals are constructed with sleeve construction to dampen vibration and prolong bond life. Tapered end is ribbed to provide a grip when driven into terminal. Pin may be easily reclaimed by pulling tapered steel pin out from other side of rail.

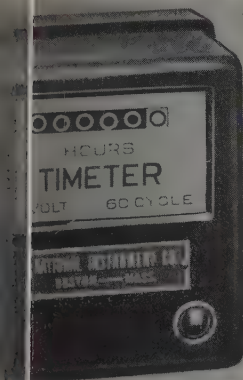
Kerosene Lubrication

■ Norton Co., Worcester, Mass., has announced grinding machine kerosene lubrication, of which grinding wheel splitters are accurate in size and finish to 0.0001-inch and resists 1 to 2 microinches on pro-

increase in lubricant temperature 4 per cent over room temperature with kerosene and 68 per cent with oil.

Counter

The counter to automatically register the total number of any electric device or machine has been in the market by National Co., 44 School street, small slow-speed self-synchronous motor drives numbered wheels through Meter is 39/16 x 3 3/4 in size and has maximum of 99,999.9 hours. Figure reads tenths of 1 is 110-125 volts, 60



2 watts. Connections are directly across the any alternating current of same voltage and frequency.

Machine

Machine Co., Wayne, has announced its im- Lanhydro hydraulic turning machine. Hy- started by depression is more flexible to suit of material. Position st forward speed of ecked is made adjust- of different lengths.

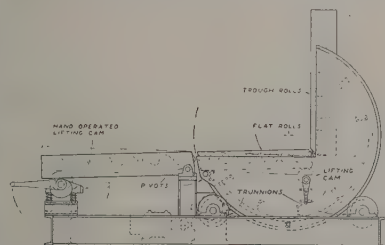


se feed is used through- ing operation. Carriage variable fine finishing able dwell period per- ean-up cut, making it

possible to hold work to extremely close limits in length. Turning head automatically closes as carriage returns.

Two-Way Turnover

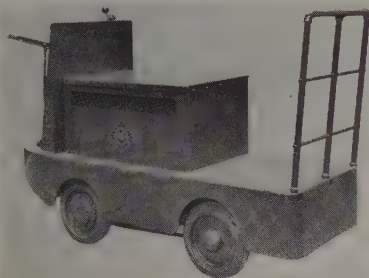
■ Logan Co., Louisville, Ky., has developed two-way turnover with adjustable slope provided for leg of turnover and corresponding adjustable slope for loading section of rolls which feeds coils to or receives them from the turnover. This adjustable slope, available for both legs, permits coils to roll onto turn-



over or away from it. Cam shafts operated by hand lever adjust slope of turnover leg and loading section. Auxiliary section on flat roll side is loaded and unloaded by magnet crane, and trough roll side by ram truck.

Industrial Truck

■ A small industrial truck-tractor, type IE, with a rated capacity of 3000 pounds is built by Elwell-Parker Electric Co., 4205 St. Clair avenue, Cleveland. Truck has four speeds forward and four reverse. Wheel base is 37 inches and overall length is 84 inches. Frame is made up of heavy section formed plates



welded into rugged one-piece construction including control dash and pedal guard. Platform is fitted with detachable end gate which may be adjusted to carry additional load. Truck also is made to pull trailers. Drive unit employs free coasting high efficiency worm and gear. Truck is built under the Underwriters laboratory's re-examination service.

Conversion Drive Unit

■ Quality Hardware & Machine Corp., 5839 North Ravenswood ave-

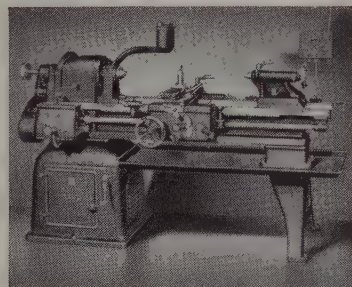
nue, Chicago, is manufacturing a motor drive which is applicable to any belt-driven machine and is especially suited for converting line



shaft drives on cone pulley machines to individual motor drives. "V" belts are used for motor drive to countershaft, the final drive being by standard flat belt. Control is hand operated, though units can be equipped for electrical controllers.

Swing Lathe

■ South Bend Lathe Works, South Bend, Ind., has a 14 1/2-inch lathe in motor drive and countershaft drive in bed lengths of 5, 6, 7, 8 and 10 feet with distance between centers of 24 1/2, 36 1/2, 48 1/2, 60 1/2 and 84 1/2



inches in quick change gear and standard change gear types. Headstock spindle is alloy steel carburized, hardened and ground with phosphor bronze bearings. Specifications include swing over saddle of 10 1/2 inches and thread cutting range of quick change gear model of 4 to 224 screw threads per inch. Metric lead screw and metric graduations are available. Attachments include hand lever type draw-in collet chuck, hand lever tailstock, hand lever double tool slide, oil pan, pump and piping, turret attachment and 4-way tool post.

Salt Tablet Dispenser

■ Davis Emergency Equipment Co. 55 Van Dam street, New York, has a salt tablet dispenser of black plastic chemically inert to salt. When knob at bottom is turned in either

direction, one tablet is dropped into palm of hand. Large size holds 1000 tablets, and small size, suitable for mounting on truck serving field workers, 500.

Telescoping Tilt Truck

■ The Atlas Car & Mfg. Co., 1120 Ivanhoe road, Cleveland, has 3 ETF fork trucks with tilting mechanism of nonjamming type, operating continuously in either direction by



crank motion. Hoist carriage has centrifugal lowering brake and safety lowering ratchet. Power is from 24 to 28-cell Edison C8 36 volts batteries or gas-electric unit. Travel speed without load is 4 1/4 miles per hour, with 5000-pound load 4 miles per hour and with 6000-pound load 3 1/4 miles per hour. Hoisting speed without load is 24 feet per minute, with 5000-pound load 13 feet per minute and with 6000-pound load 12 feet per minute. Lowering speed is 30 feet per minute.

Cable and Drum Hoist

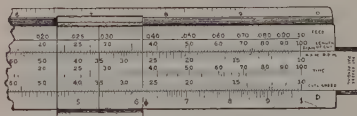
■ Conco Engineering Works division of H. D. Conkey & Co., Mendota, Ill., has announced a cable and drum type electric hoist with double



drum construction for trolley, hook or lug suspension in capacities from 250 to 1000 pounds. Mechanism is fully enclosed in oil tight, weather proof, dust proof housing finished in blueslate gray baked Wrinklelac, and has two gear reductions—one worm gear and one spur gear. Drums are 30 times cable diameter. All cables have minimum factor of safety of eight. Load is centered and held in balance.

Industrial Slide Rule

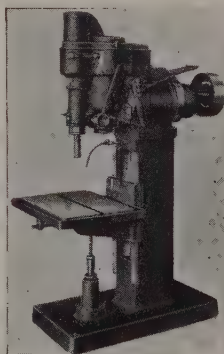
■ Eugene Dietzgen Co., 2425 Sheffield avenue, Chicago, offers Langsner industrial slide rule requiring only one setting of slide in most cases. Face has six scales—two above slide show feed, length of cut



and diameter; three on slide represent revolutions per minute, time and cutting speed; regular D-scale is below slide. B, CI and C-scales for standard slide-rule calculations are below slide. Unit is 10 inches long, engine-divided on white celluloid and has glass "frameless" indicator.

Tapping Machine

■ L. J. Kaufman Mfg. Co., Manitowoc, Wis., offers Hi-duty Tapper operating on same principle as hand tapping but with increased sensitiv-



ity as working strain is weighed to a fraction of an ounce. Having no friction adjustments tapper prevents tap breakage.

Vertical Broach

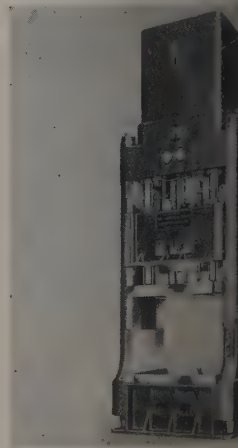
■ Cincinnati Milling Machine and Cincinnati Grinders Inc., Cincinnati, offers single ram vertical hydro-broach machines in 12 standard sizes from No. 1-18 with an 18-inch ram stroke and 2000 pounds normal broaching force to No. 15-60 with 60-inch ram stroke and 30,000 pounds force. Standard fixed-table machines are built for single cycle operation



and ram stops at end of. Either full automatic cycle operation may with receding-table type. Both types may be reversed instantly by levers. Chip compartment but the No. 1 permits returns while operator returns to broaching position. All iron and Meehanite.

Deep-Drawing Press

■ The Hydraulic Press Mount Gilead, O., has H-P-M Fastraverse press for deep-drawn metal having pressure 425 tons on main ram action service, 300 tons ram for drawing service blankholder and 50 tons ion. Pressing areas 4 inches for main slice inches for overall blank with center opening 4 inches and 35 x 35 inch cushion. Main draw plate holder ring and die bottom drawing die are hydraulic actions controlled of each other.



Quality and Quantity
Production Shift to

MO-MAX*

TRADE MARK REG. U. S. PAT. OFF.

MOBILIUM-TUNGSTEN HIGH SPEED STEEL



Booklet with basic data, write
CLEVELAND TWIST DRILL CO., CLEVELAND

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Alum Steel Corporation	Halcomb Steel Division,
Steel Company	Crucible Steel Company of America
Steel Corporation	Jessop Steel Company
Steel Company	Latrobe Electric Steel Company
Company of America	Simonds Saw and Steel Company
& Sons, Inc.	Universal-Cyclops Steel Corporation
	Vulcan Crucible Steel Company

CANADA

Atlas Steels Limited
Henry Disston & Sons, Inc.

GREAT BRITAIN

Atlas Steels Limited
Deutsche Edelstahlwerke A.-G.

FRANCE, GERMANY, ITALY,
SWEDEN

Deutsche Edelstahlwerke A.-G.

MO-MAX is a proprietary name owned and controlled by The Cleveland Twist Drill Company, and its only use by others is on steel made and sold by licensees under patents owned or controlled by said Company.

NEW METAL PRODUCTS

■ Residential and commercial stokers announced by Link-Belt Co., Chicago, have air supply automatically controlled to compensate for changing combustion. Air duct and coal tube are combined into a single tube. Sectional tuyeres permit expansion and contraction without cracking. Louvres for air intake are located in back panel. There is no shear pin on drive shaft and an automatic load signal is provided. Smoke-back is prevented without use of external pipes. Transmission compartment and inside of hopper are sprayed



with rust-resisting compound. Stokers come in two shades of maroon trimmed with chromium and black.

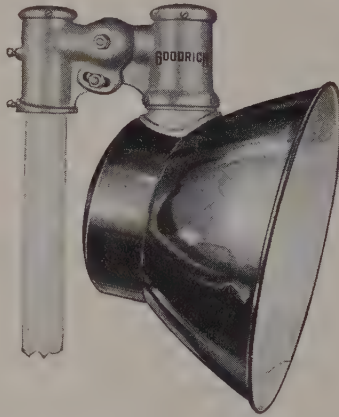
■ A power shovel which can be converted for use as a dragline, clamshell or crane has been developed by Bucyrus-Erie Co., South Milwaukee, Wis. Of two-cubic-yard capacity, machine is available with gasoline, diesel or electric power. Machine has new type chain crowd which provides powerful crowd-out and high speed retract. Crowd, hoist and swing are synchronized to give maximum output. Dipper has short back and



curved door with teeth made of forged tool steel which are reversible and replaceable.

■ A floodlight designed to give a higher degree of light projection as well as assuring a wide spread of light has been announced by Good-

rich Electric Co., 2935 North Oakley avenue, Chicago. Fixture may be pole-mounted or attached to walls or other flat surfaces by means of a bracket arm which provides uni-



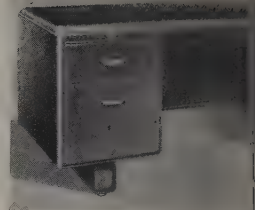
versal adjustment so that flood of light may easily be directed exactly where needed. Floodlight is finished in permanent porcelain enamel which is easily cleaned and which retains its consistently high factor of reflection.

■ To help in quickly locating data, DataTule Co., 522 Fiske building, Boston, offers tables wound on rolls in hand sized aluminum case. Tables found in mechanics DataTule include: tapers per foot, tapers per inch, tapers for included angles by degrees, Brown & Sharpe tapers,



Morse tapers, standard pipe tapers, Standard taper pins, Jarno tapers, explanation of "ratio," standard pipe threads, US standard threads, Acme standard 29 degree, size of round stock necessary to make hexagons and squares and decimal equivalents. Case has two windows (one row of figures being visible at each window) and can be furnished with unsealed end and special blank white paper on which special data can be typewritten. Both sides of paper can be used.

■ Yawman & Erbe Mfg. Co., Rochester, N. Y., offers steel efficiency desks with pressure-cemented molded linoleum top and skid-type base which may be adjusted for floor



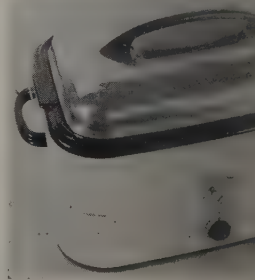
irregularities. Top has rounded metal molding coast out full length, allows additional knee space.

■ A 10-pint inbuilt liquid container is a feature of china lavatory introduced by Co., 836 South Michigan, Chicago. Container is and is filled through a valve. Lavatory, known as "wich," has self-closing, liquid soap dispenser, metal spout supply and ture. Unit is available concealed hangers or



and hanger. Lavatory inches and basin is 14 x Back is six inches high.

■ An electric roaster, meal, with an inspection the lid, is announced by house Electric & Mfg. Pittsburgh, Pa. Glass is easily removed for clean will not collect steam. is attached to each handle may be supported in side-wise positions, and is perfect condensed moisture rack raises or lowers all once and serves as baking Temperature control is ca-



Be Carburized

(from Page 61)

ereutectoid case of
0.010 inches with 0.040
s of eutectoid zone
oid region of only

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ns in the formation
ectoid zone or in the
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grain coarsening oc-
weld metal at high
temperature. Refine-
measured with the single
ustrated by Fig. 5.
core toughness, a
is recommended to
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d parent metal if its
such as to permit
ng at the high car-
ratures.

these tests may be
for other than SAE
metal by making al-
the difference in car-
rates of carbon dif-
coarsening character-

Weld Rod

should be selected
duce the least varia-
and core structure and
een the weld and par-

should be of a com-
will minimize the in-
dissolved gases, par-
en and nitrogen. As
nerous experimenters,
o marked effect upon

the carburizing proce-
able the weld to be
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der to diffuse the hy-
tation. A gaseous car-
ss is ideal for this pur-

temperature and heat
depend upon the se-
parent and weld metal.
governed by the well
ples applicable to all
rocesses.

ents Theories

noelasticity

— Structure, Strength
Action—Part III, by
Turner; 284 pages,
ches; mimeographed
oid binder; published
r; supplied by STEEL,
\$5, in Europe by Pen-
ng Co. Ltd., Caxton

House, Westminster, London,
S. W. 1.

This treatise, which by necessity
is highly complex, presents the prod-
uct of 50 years study by the author
of thermoelasticity. Its purpose is
to explain the formation of the ele-
ments from ether, heat vibration,
gravity and electrical energy, the
mechanics of chemical combination,
and co-ordinates the properties of
materials of construction. Utility of
this work, according to the author,
lies in proving the manner in which
the molecular kernel splits up or
may split up in chemical combina-
tion and the rules governing it.

It is shown that iron, instead of

being a homogeneous element, is of
triunal nature, being made up of an
atmosphere of pulsation, argon; and
atmosphere of vibration, N_2O ; and
solid spherical atoms. Gravity as the
chief phenomenon of nature is ex-
plained. It is stated that not only
can the properties of the elements be
co-ordinated thereby, but their
atomic weights, numbers and heat
of formation are intimately related
thereto.

Pages 1-146 constitute a physical
section and pages 147-240 a chemical
section, and separate indexes are
carried for the two. Much of the
physical section is devoted to the
development of 33 propositions.

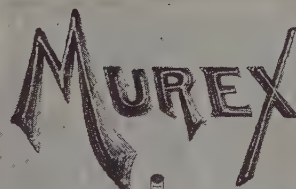
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off in the quality of work produced.
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clean deposits and beautifully
smooth, neat seams that meet every
requirement for strength and duc-
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ELECTRODES

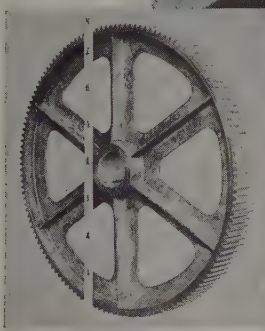
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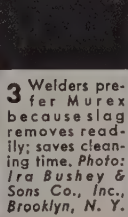
1 High speed deposition saves
time in producing large gears.
Photo: Lakeside Bridge & Steel
Co., Milwaukee, Wis.



2 Ample physical properties for
welds in heavy duty equipment
are assured by using Murex. Photo:
S. Morgan Smith Co., York, Pa.



4 It's easier to qualify welders for pressure
vessel work with Murex. Photo: Edge
Moore Iron Works, Edge Moore, Del.



3 Welders prefer Murex
because slag
removes read-
ily; saves clean-
ing time. Photo:
Ira Bushey &
Sons Co., Inc.,
Brooklyn, N. Y.



5 Ten cents per pound of weld metal were
saved by Murex on one tank fabricating
job. Photo: Stearns-Roger Mfg. Co., Den-
ver, Colo.

Making Auto Parts

(Concluded from Page 44)

brass head lamp bodies is handled at rate of 1000 to 1100 per hour on a second set of automatic nickel and chromium plating lines.

On a third automatic setup hub cap covers, lamp and door moldings and similar parts are handled at rate of 950 to 1000 per hour. Here each conveyor line takes the parts through both nickel and chromium plating operations. These operations are handled all on an end loading, return-type conveyor equipped with transfer units. Since this is rather an unusual series of operations, steps and various baths involved warrant listing.

The 19 operations involved are as follows: 1, a high pressure spray cleaner of alkaline content; 2, an electro bath cleaner; 3, a more lightly loaded electro cleaner; 4, cold water rinse; 5, cyanide dip; 6, cold water rinse; 7, acid dip; 8, cold water rinse; 9, nickel plate; 10, reclaim rinse bath; 11, cold water rinse; 12, cleaning bath; 13, cold water rinse; 14, acid dip; 15, rinse bath; 16, chromium plate; 17, reclaim rinse bath; 18, cold water rinse; 19, hot water rinse.

Cap Covers of Drawn Brass

These hub cap covers are made of brass 0.015-inch thick. They are drawn in two operations before plating. The hub cap bodies used with these covers are made from steel stock 0.032-inch thick. These are first drawn, trimmed, formed and then edge rolled. This is followed by zinc plating. Next the cover is

clamped to the body and letters painted in the embossed cover parts, followed by baking.

Reflectors of raw brass, after going through blanking, rough forming, trimming and final forming operations, go through an automatic silver plating line which includes the following 14 operations: 1, electro bath cleaner; 2, rinse; 3, cyanide rinse; 4, cold water rinse; 5, acid rinse; 6, cold water rinse; 7, nickel plate; 8, rinse; 9, rinse; 10, silver plate; 11, reclaim bath rinse; 12, cold water rinse; 13, hot rinse using condensed water to prevent water stains; 14, drying at 150 degrees temperature for three minutes.

Manufacture of reflectors and their finishing is all handled on overhead chain conveyors with operations grouped in one part of the plant for maximum efficiency.

It will be seen from the description of these operations that a huge volume of parts is handled with greater efficiency through a large number of operations by use of effective conveyor systems. In fact, entire overhead area in this plant is a maze of conveyors.

Plating Rack Coating

■ United Chromium Inc., 51 East Forty-second street, New York, has placed on the market a new coating material for racks used in all plating processes. Known as Unitchrome Rack Coating "W," it usually is applied by dipping and then baked at 200 degrees Fahr. Multiple coats are recommended. It forms a non-porous, tightly adhering coat,

is not affected by boiling alkali cleaners or plating and does not flow or crack.

Practical Volume Art of Toolmaking

■ **Tool Making**, by C. E. 211 pages, 5½ x 8½, published by American Tool Society, Chicago; supplies for \$3.50; in Europe by Publishing Co. Ltd., Cav Westminster, London S.

Importance of the stressed in this volume, in modern production ing. The text is written beginning toolmaker is simple facts about tools and the equipment shop provides, to the the toolmaker's craft. through presentation of cal jobs as finished workings and the tools they may be made from the. Information thus supplied of the drawings they make an important part the training of any tool

The author has had of practical experience and manufacture and the in the book has decided value for the man seeking to increase his technical knowledge.

Open Hearth

(Concluded from Page 44)

mite. Ladle also is heated color just prior to tapping.

Since such small heat temperature rapidly and the sufficient head in the ladle to produce a cutting action which freezes in the necessary to use 1½ to 2 zles. Ingots of sizes shown 1 are poured. Surface of ingots are as good or better usual run of production.

The furnace is equipped with indicating and recording and is manually controlled. automatic control of air roof temperature and furnace pressure is being considered.

The recuperator installed operated satisfactorily, and interesting data is being concerning advisability of a system in larger installations.

Before attempting experimental work, a series of heats for comparison purposes indicated definitely that properties of steels made in general comparable to produced in mill furnace. this fact established, the work is being undertaken that results obtained can be put to production shops.

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Grinding Machine

Grinding Machine & Cinders Inc.—10 page illustrated bulletin No. G-427. The 36 inch, 50 inch and 60 inch machines for necks and light, concave and convex plate mill rolls and sheet rolls are fully described. Standard and accessory equipment covered.

Myers & Bro. Co.—84 page catalog No. IP38. This catalog contains medium sized pumps of a wide range of types. Full technical data given on applications, design and construction. Recommended methods of engineering data is included.

Blast Cabinet

Manufacturing Co.—Illustrated bulletin No. 20-B. A utility cabinet for cleaning small parts which are cast, milled, turned. Said to be inexpensive and rugged in construction.

Screw Chart

Corporation—Circular slide chart, condensing in a form for ready reference, a large amount of dimensional data on cold set screws. Distribution by engineers, draftsmen and mechanics.

(5)—All Purpose Torch

Weldit Acetylene Co.—Illustrated data sheet No. 6A-49, describing the new "Weldit" all purpose torch for welding, cutting and brazing. For use with either equal or tank pressure, with manufactured or natural gas. Numerous new features are fully described, and a parts list emphasizes breadth of use.

(6)—Refractories

A. P. Green Fire Brick Co.—8 page illustrated bulletin No. P-11. Describes characteristics of super duty fire brick and illustrates by means of natural color photographs the changes that occur when brick is heated to service temperatures. Test data on this refractory brick are also given.

(7)—Electric Hoist

H. D. Conkey & Co.—4 page illustrated bulletin announcing the new "Torpedo" electric hoist, with capacities of from 250 to 1000 pounds. Push button control, cable and drum type and heavy construction, coupled with lug, hook or trolley type design, give this unit wide flexibility.

(8)—Elevators

Rotary Lift Co.—12 page illustrated file folder bulletin No. RE-300. "Oil-draulic" elevators for lifts of 30 feet and less are low in cost to install, maintain and operate. Three types of operation are available. Full installation and operating information are given.

(9)—Steel Strapping

Acme Steel Co.—24 page illustrated bulletin No. AD-7. Methods of using the Acme "Unit-Load" of preparing materials for shipment are described for numerous industries. Sheets, strip, angles, merchant bars and other metal products are shown prepared for shipment. Finished and semi-finished products are also shown. "Unit-Load" equipment is fully described.

(10)—Galvanizing Powder

American Solder and Flux Co.—4 page illustrated bulletin. Outlines and describes method of galvanizing and tinning for protecting surfaces that have been welded, or that have the protective surface broken in fabrication. Simple method of application can be done in the shop or on the job.

(11)—Cutting Oil

E. F. Houghton & Co.—4-page illustrated bulletin No. 2-113. "Cut-Max Base No. 7", highly concentrated cutting oil which has higher content of active sulphur is especially suited for machining all carbon and alloy steels. Value of active sulphur is described in detail.

(12)—Valves

Crane Co.—8 page illustrated folder No. AD-1311. This bulletin on globe and gate valves includes 2 large charts that are useful in selecting the proper valves for specific duties. A section includes helpful hints on application of valves.

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HELPFUL LITERATURE

(13)—Screwdrivers and Bits

The Apex Machine & Tool Co.—12 page illustrated catalog and manual. Apex-Phillips screwdrivers and bits for electric, air and spiral drivers are covered. Tables for determining correct bit size for Phillips wood, machine and sheet metal screws and stove bolts in various styles are given. Prices are included.

(14)—A. C. Motors

Crocker-Wheeler Electric Mfg. Co.—12 page illustrated bulletin No. 251-A. Alternating current, adjustable speed, "polyspeed" motors are described. New information not previously covered includes various types of regulators available for manual, remote and automatic speed control. Installations are illustrated and described.

(15)—Insulated Conductors

Rockbestos Products Corp.—64 page illustrated loose leaf handbook-catalog No. 10-E. Illustrates and describes standard line of wire, cable and flexible cords as well as some new products. Use and applications are covered and a section on proper selection of conductor is included. Cross-indexed for reference.

(16)—Vacuum Cleaning

The Spencer Turbine Co.—20 page illustrated bulletin No. 120. Vacuum cleaning, a new development in industrial cleaning is fully covered. Floors, walls, pipes, machinery, products and ceilings are cleaned more quickly and inexpensively by this method. Installation data are given.

(17)—Industrial Equipment

Struthers-Wells—16-page illustrated catalog of "Equipment for the Process Industries". General descriptions are given of pressure vessels, rotary dryers, kilns and coolers, mixing equipment, heat exchangers, evaporators, and stainless steel and corrosion resistant equipment.

(18)—Welding Lenses

American Agile Corp.—Illustrated bulletin Supplement No. 119-A. "Agile" mirror lenses for welding increase visibility up to 42 per cent, reduce glare and eye fatigue, and protect against ultra-violet rays. Available in standard sizes and shades. Progress of the welding arc can be seen clearly through these lenses.

(19)—Drop Hammers

The Ajax Manufacturing Co.—12 page illustrated bulletin No. 120. The new "Rodrop" hammer operates without boards by means of a rigid steel rod taper-fitted in ram. Rolls fitted with durable friction materials. This forging hammer is said to be fast, flexible, powerful and inexpensive to operate.

(20)—Rust Proofing

Parker Rust Proof Co.—40 page illustrated catalog and data book on "Bonderizing." Theory and application of this process for rust proofing are covered and natural color photographs, charts and full descriptive information are included. Typical uses are shown and comparative results of panel tests are illustrated.

(21)—Insulated Conductors

General Cable Corp.—4 page illustrated bulletin "An Engineering Analysis of Super Service Cords and Cables." Describes method of vulcanizing rubber for covering of heavy duty cords and cables. Other features are covered. A sample requiring 250 pounds pull to break is included.

(22)—Recording Controller

The Foxboro Co. — 4 page illustrated bulletin No. DMF-765. Fully explains the mechanism and operating advantages of a new potentiometer indicating recording controller. Detailed explanation of construction operation and general specifications are given.

(23)—Phosphor Bronze

The Riverside Metal Co.—Illustrated catalog on Riverside phosphor bronze. Data and information included on unusual characteristics of phosphor bronze and applications of this metal in a variety of industrial uses. Fundamentals and data on recent developments are covered. Characteristics of various grades and typical uses are included.

(24)—Stampings

Detroit Stamping Co.—8 page illustrated pocket size bulletin. Types of stampings for many types described and illustrated. The smallest to 46 inches in diameter and 3/8 inch thick. Known commercial metal suitable materials are covered. Examples for production parts are described.

(25)—Diesel Engines

Worthington Pump and Corp.—8 page illustrated bulletin S-500-B36. The vertical for direct-injection, totally enclosed CC diesel engine developed for continuous heavy-duty loads is described. Specifications of sizes and complete descriptive information are given.

(26)—Piston Rings

Koppers Co. — American Piston Ring Division—4 page illustrated pocket size engineering book. Manual giving recommendations, specifications and details of piston rings for machine and operators. Distribution operating and designing engineers to executives responsible for replacement in steel plants.

(27)—Bushings and Bearings

Merriman Brothers, Inc.—4 page illustrated bulletin No. 40. Self-lubricating bushings and bearings in several types and for use where lubrication is difficult, immersion in oil, and exposure to abrasive weather are present. Typical applications are shown.

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Workers Real Prosperity lies in Business Revival"

(from Page 18)

cannot be refuted, ex-
cused or denied. No one
will deny that the
people are now pay-
ing taxes which the na-
tion collects. Cer-
tain administration
that in most lines of
the workers of
receive about 80 cents
income dollar from
in private business.

facts in themselves
real hope for pros-
perity revival of business,
and there is no hope
from any other
source.

example of the havoc
the governmental poli-
cy in this country
has wrought.

It was a republic, with
freedom in many ways
the United States, dis-
sentimental groups began
to pledge to give
to the unemployed and
favor the trade guilds,
very powerful in Rome
in the days of the republic.
Conditions, prices kept
employment increased
the guilds eventually ob-
tained monopoly of all jobs. As
wages went up and up, un-
employment increased. Inflation
reached such proportions
money became prac-
tically worthless—gold practically
from circulation as it
became precious. At one time,
gold was used as money.

"Life" Not New

the measures, which led
to the destruction of Rome,
were offered in the name
of humanity, to relieve
the people, to provide a more
life, by the boys who were
doing something about it."

the so-called progres-
sives of the Roman
their successors of the
are called the progres-
sives of today.

are the conditions that
fall of the republic.
city groups ushered in
of the dictators, Sulla,
and Crassus, who in turn
of the Caesars. The dic-
tators their terms of office,
managed to straighten
to extent the evils and
brought on by these
groups, but under the

Roman Empire the same thing oc-
curred again.

The policies which I have crit-
icized in this country—that is, of
attacking and harassing business
and preventing its normal revival—
have created every dictator in
Europe.

The swiftness with which policies
are promulgated and in the face
of criticism, altered and changed
but never abandoned, induces a
goodly proportion of our people to
think that all proposed action is
progress. Sometimes it is, but
many economic crimes are com-
mitted in the name of progress be-
cause the experience of the past
is disregarded, because the reme-
dies, while temporarily beneficial,
end up worse than the disease.

History Repeats Itself

The present national administra-
tion is literally filled with the
counterparts of those who wielded
power in Ancient Rome. These men
preach democracy and free enter-
prise, while they set in motion the
machinery to destroy it.

Frequently, they abuse the gov-
ernments of Russia, Germany or
Italy, heaping criticism on these
governmental systems of state con-
trol and in the next breath they ad-
vocate the measures which will im-
itate them. In their advocacy of
economic policies, they embrace the
identical systems which they in
generalities frequently condemn.

They proclaim that the American
system of government under which
we live, and which has brought us
to the highest standard of living
in all the world's history, is in truth
a great failure and must be re-
placed by systems that have proven
over and over again to be a sure
means of ruin.

They profess a belief in democ-
racy, while attempting to get con-
trol of an independent branch of
the government, the Supreme
Court; by attempting to drive out
of public life, by the use of federal
funds and federal power, the men
who dare to disagree with them and
dare to fight for the preservation
of the institutions of this country.

These are the men who disregard
over and over again the fact that
the working man, rather than the
well-to-do, has been paying and will
continue to pay over half of the tax
revenues of the nation; that it is
the working man and not the well-
to-do who receives approximately
80 cents out of the business income
dollar.

I suggest to you gentlemen that

you help carry these eternal truths
to those with whom you are asso-
ciated in business. Put the gov-
ernment charts on the wall, about
the pay and the taxes of the masses
of the people, and you will begin
to get a response, because the
American working man and woman
are sound at heart when they are
in possession of the facts.

Some high authorities look with
apparent scorn on the lack of con-
fidence among business men in the
present state of affairs. They think
recurring deficits, continual tirades
against business leaders, changing
tax structures and countless inno-
vations of government are no im-
pediments to a business revival.
This point of view is so juvenile
that it is unworthy of refutation.

No sensible man is inclined to
take risks, to enlarge his plant, to
replace outmoded equipment, to
lay in a stock of goods beyond day
to day needs, when he cannot even
remotely guess what new experi-
ment touching his business, what
new tax, what new lavish and waste-
ful governmental expenditures are
to be inflicted today or tomorrow.

In spite of the inspired derision
there is to the lack of business con-
fidence, if fear is banished and a
genuine respect and confidence for
and in governmental policy is re-
stored, it is the one thing that will
provide more jobs than all the re-
lief appropriations will provide
from now until doomsday.

Program Is Proposed

I suggest the following as a par-
tial program to restore confidence
and to create new employment for
the idle, in private business.

First, reorganize the federal gov-
ernment to accomplish not alone
efficiency but real and general
economy. Let me point out one
item to illustrate. Many millions
can be saved in all departments by
dropping the press agents and
propaganda and other activities
which are costly, and more political
than anything else.

Second, eliminate more than a
score of borrowing corporations
and agencies of the federal gov-
ernment and let the United States
treasury borrow as needed for all
the federal government. Then our
national obligations may be a part
of our national government busi-
ness statement. Today, many agen-
cies are borrowing billions of dol-
lars which the government really
owes but which are not carried as
a part of the government's obliga-
tion. An example of this is the
U. S. Housing Authority which has
so borrowed \$800,000,000 and is now
about to borrow \$800,000,000 more.

Third, have a thoroughly honest
purge of the welfare rolls, and base
relief on real need, coupled with a

requirement that localities bear a definite portion of the burden so that local interests may be aroused and demand elimination of the frequent abuses.

Fourth, whatever monies it is necessary to appropriate for the welfare of our people, have a tax program that raises sufficient revenue to at least approximate the staggering appropriations and recurring deficits of the present day. This can be done by broadening the income tax base so that each citizen in the nation, according to his ability to pay, carries a part of the national tax burden. We must wipe out the deficits or at least reduce them to understandable proportions.

Recognize Employer's Rights

Fifth, overhaul the Wagner labor act, by giving the employer the right to the free speech guaranteed by the constitution and the right to speak out and to act when he believes that influences are attempting, not to help but to exploit those who work with him.

Sixth, revise the social security act. Eliminate the intended accumulation of reserve invested only in the national debt. Place it on more of a pay as you go basis. It is full of inequalities. At present the farmer gets no direct benefit from it, yet he pays his share of security taxes just the same, for the employers' social security taxes are passed on in increased prices to this large group of our citizens.

Seventh, remove the expenditure of public funds from one man domination, where too often political considerations rather than the public welfare dictate where and how it shall be spent, as was the case in the building of bridges in Maryland during the last campaign.

Eighth, keep the three branches of our government, executive, legislative and judicial, independent of each other, by resisting encroachments of any one upon the other two.

I believe that the accomplishment of these things will, more than any others, restore needed confidence and put our country on the road to better times. It may be that there are a score of important things to do in order to revive the business of the nation. But do each and every one of them and fail at the same time to restore confidence in government and they will not avail to accomplish the recovery intended. Without confidence there can be and will be no real business revival.

Finally, let me repeat: Let the 50 million workers of this nation employed in private business know, through information and education, that theirs is the biggest stake of

all in a revived business; that the present state of affairs demands that business in every form, big and little, should be encouraged, not discouraged; helped, not hindered; supported, not attacked; for with the coming of confidence and the revival of business there is work for the unemployed at good wages and steady hours, a better market and better prices for the farmer, a decrease in the governmental burden of taxation and a normal way of American life.

We are rapidly approaching a decisive moment in our national history. The men who love America cannot be content to stand on the side lines. The facts which I have attempted to present here tonight should be represented in understandable form to the scores of millions who work every day in private business for a living. The time to commence is now. America's past, by comparison with that of any other nation, is the greatest of them all, and her future will be the greatest of them all in those in positions of leadership, in and outside of government, stand by the eternal truths of history and carry the facts about the present day to the millions of our fellow citizens.

Mill Supply Groups Denounce Reciprocity

(Concluded from Page 20)

son & Sons Co., New Haven, Conn.; first vice president, H. K. Clark, Norton Co., Worcester, Mass.; second vice president, R. G. Thompson, Lufkin Rule Co., New York. Horace Armstrong, Armstrong Bros. Tool Co., Chicago, was re-elected treasurer; and R. Kennedy Hanson, Pittsburgh, re-elected secretary-manager. Executive committee: C. O. Drayton, American Screw Co., Providence, R. I., chairman; D. W. McAllen, SKF Industries, Philadelphia; H. G. Morrow, Central Tube Co., Pittsburgh; G. E. Dresser, Carborundum Co., Niagara Falls; H. P. Ladds, National Screw & Mfg. Co., Cleveland; and A. A. Murfey, Cleveland File Co.

National Supply and Machinery Distributors' association elected: President, Charles E. Curtis, Western Iron Stores Co., Milwaukee; first vice president, A. R. Smith, Boyer-Campbell Co., Detroit; second vice president, H. V. Waterman, Hendrie & Bolthoff Mfg. & Supply Co., Denver; executive committee, representing area No. 1, F. Marsena Butts, Butts & Ordway, Cambridge, Mass.; area No. 3, Tyler M. Carlisle, Strong, Carlisle & Hammond, Cleveland; area No. 4, Samuel H. Clark, Samuel Harris & Co., Chicago; and area No. 6, A. J. Glessner, A. J. Glessner Co., San

Francisco. Members of tee representing other area elected. George A. Ferdelphia, was continued secretary, and Henry R. Philadelphia, as secretary.

Southern Supply and Distributors' association. President, Edward F. Ver H. Van Horn Co. Inc., leans; first vice president, Bates, Moore-Hanley Hardware, Birmingham, Ala.; second, J. B. Crimmins, Morton Supply Co., Chattanooga. Executive committee: J. Briggs-Weaver Machinery, Tex.; Robert S. P. Walke Co. Inc., Norfolk, Va.; Lilley, Superior-Sterling, field, W. Va., and H. M. Turner Supply Co., Mobile. Smith was re-elected secretary.

Dallas, Tex., was selected for 1940 convention, the time announced later.

Obsolete Steel Plants Give Way to Modern

■ Abandoned or dismasted 1926 have been 173 blast furnaces and 39 plants for producing pig iron and 144 plants making steel products. This is disclosed by reports furnished by steel plants to the American Iron and Steel Institute.

Total number of employees in the steel industry, however, increased during the period. A new plant was established in 1937, total number currently still substantially higher than in 1926.

Nearly all the plants abandoned or scrapped rendered obsolete or improved production. Fewer than a dozen were closed as a direct result of consolidations.

Any decline in production by the abandoned or obsolete plants has been offset by construction of more efficient plants, and modernization of existing plants. Thus present capacity for producing steel is 30 per cent greater than in 1926, while pig iron production is substantially the same.

Between 1926 and 1937, 193 blast furnaces were abandoned, capacity averaging 2½ million tons of furnaces abandoned per year. Constructed during this period were 12 new steel ingot furnaces and 42 new plants for producing steel.

■ Malleable iron casting production in April totaled 31,694 tons compared with 39,615 tons

Steel Production Increases Further Output Expands Faster Than Consumption; Shapes Active

MARKET IN TABLOID ★

Demand

Up slightly; heavy products have better outlook.

Prices

Fairly steady despite occasional shading.

Production

52 per cent, best in eight weeks; pig iron drops.

Demand is slightly more active but by a great deal less than is indicated by the sharp rise in production the past two weeks.

Output rose 4 points last week to 52 per cent, against 48 per cent a year ago, and comparing with 25½ per cent a year ago.

Factors, mostly seasonal, will prevent continued growth for the next 30 days from matching the recent boom in making. Nevertheless, the industry is confident that gradual betterment will prevail during the second half.

Builders will require only small steel for a number of weeks; some farm equipment makers have scheduled shutdowns later this year after July 4; railroad needs are likely to be restricted for the near future, and requirements for other consumers usually moderate seasonal periods.

Steelmaking will receive strong support from backlogs of sheets and strip acquired a year ago. In some instances releases of this material are heavier than expected, although automobile makers naturally prefer to postpone receipt of the material they have on order until next year when assembly of new models will begin.

Output of heavy operations of sheet and strip in the last few months is seen in stated intentions of producers to clear books of their low-price inventory as soon as possible. However, it is questionable whether all tonnage will be shipped by the end of the year, particularly automotive steel.

Auto Strike Cut Assemblies Sharply

Auto assemblies dropped sharply last week, the result of holiday shutdowns and the Briggs strike. Last week's output of 32,445 units was a decline of more than 10 per cent from 36,000 a year ago. Chrysler output fell against 5650 the week before; Ford fell from 20,350 to 1600, General Motors from 10,670 and all others from 10,060 to 6075. The extent of the decline is indicated for this week, the extent of the decline in the labor situation. The latter also affects new model preparations.

Daily average pig iron production in May was down 19.2 per cent from April but 37.2 per cent larger than a year ago. Last month's output was restricted by the banking of furnaces to conserve fuel during the coal mining tieup. Many of these stacks since have resumed. At the end of May, 107 blast furnaces were active, against 102 April 30. Total pig iron production in May was 1,716,544 tons, compared with 2,055,326 tons in April and 1,260,937 tons a year ago. Output the first five months of 10,400,731 tons was 51.4 per cent ahead of the 1938 period.

Pig iron prices have been reaffirmed for third quarter. Finished steel quotations generally are steady, despite occasional shading on certain products.

Construction, Ship Work Aid Plates, Structural

Recent developments in heavy steel markets are favorable. The navy has placed eight destroyers and eight submarines requiring 9500 tons of steel, and 30,000 tons will be required for 12 merchant ships on which the maritime commission is expected to ask bids shortly. Structural shapes and concrete reinforcing bars are more active. Last week's awards of the former were among the heaviest so far this year, more than 33,000 tons alone being involved in seven orders.

Railroad equipment markets are enlivened slightly by an inquiry from the Western Maryland for 1110 freight cars. Pending freight car business otherwise is light, while mill backlogs of track material gradually are declining.

Most districts shared in last week's rise in steelmaking. Gains included 6 points to 42 per cent at Pittsburgh, 4½ points to 53½ at Chicago, 11 points to 70 at Wheeling, 2 points to 44 at Buffalo, 3 points to 60 at Birmingham, 8 points to 60 at Cincinnati and 3 points to 48 at Youngstown. New England was off 10 points to 35, Cleveland was down 1 to 53 and St. Louis declined 1½ points to 37½. Eastern Pennsylvania at 37 per cent and Detroit at 57 were unchanged.

Scrap is stronger in a number of districts, but buying has yet to follow the upturn in consumption and the price composite is unchanged at \$14. The finished steel composite holds at \$55.70.

COMPOSITE MARKET AVERAGES

	June 3	May 27	May 20	One Month Ago May, 1939	Three Months Ago March, 1939	One Year Ago June, 1938
Iron and Steel	\$35.59	\$35.63	\$35.63	\$35.80	\$36.40	\$38.41
Finished Steel	55.70	55.70	55.70	56.00	56.50	61.55
Steelworks Scrap..	14.00	14.00	13.96	14.05	14.98	10.89

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shafts, pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plate, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material					Pig Iron				
	June 3, 1939	May 1939	March 1939	June 1938		June 3, 1939	May 1939		
Steel bars, Pittsburgh	2.15c	2.20c	2.25c	2.45c	Bessemer, del. Pittsburgh	\$22.34	\$22.34		
Steel bars, Chicago	2.15	2.20	2.25	2.40	Basic, Valley	20.50	20.50		
Steel bars, Philadelphia	2.47	2.52	2.57	2.47	Basic, eastern, del. Philadelphia	22.34	22.34		
Iron bars, Terre Haute, Ind.	2.05	2.10	2.15	2.35	No. 2 foundry, Pittsburgh	22.21	22.21		
Shapes, Pittsburgh	2.10	2.10	2.10	2.25	No. 2 foundry, Chicago	21.00	21.00		
Shapes, Philadelphia	2.215	2.21 1/2	2.21 1/2	2.40 1/4	Southern No. 2, Birmingham	17.38	17.38		
Shapes, Chicago	2.10	2.10	2.10	2.25	Southern No. 2, del. Cincinnati	20.89	20.89		
Plates, Pittsburgh	2.10	2.10	2.10	2.25	No. 2X, del. Phila. (differ. av.) ..	23.215	23.215		
Plates, Philadelphia	2.15	2.15	2.15	2.371	Malleable, Valley	21.00	21.00		
Plates, Chicago	2.10	2.10	2.10	2.25	Malleable, Chicago	21.00	21.00		
Sheets, hot-rolled, Pittsburgh	2.00	2.05	2.15	2.40	Lake Sup., charcoal, del. Chicago ..	28.34	28.34		
Sheets, cold-rolled, Pittsburgh	3.05	3.10	3.20	3.45	Gray forge, del. Pittsburgh	21.17	21.17		
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.75	Ferromanganese, del. Pittsburgh ..	85.33	85.33		
Sheets, hot-rolled, Gary	2.00	2.03	2.15	2.40					
Sheets, cold-rolled, Gary	3.05	3.08	3.20	3.20					
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.80					
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.90					
Tin plate, per base box, Pitts.	\$5.00	\$5.00	\$5.00	\$5.35					
Wire nails, Pittsburgh	2.45	2.45	2.45	2.75					
Semifinished Material					Coke				
	June 3, 1939	May 1939	March 1939	June 1938		June 3, 1939	May 1939		
Sheet bars, Pittsburgh, Chicago.	\$34.00	\$34.00	\$34.00	\$37.00	Connellsville, furnace, ovens.	\$3.75	\$3.75		
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	37.00	Connellsville, foundry, ovens.	5.00	5.00		
Rerolling billets, Pittsburgh	34.00	34.00	34.00	37.00	Chicago, by-product fdry., del.	10.50	10.50		
Wire rods, No. 5 to 3/8-inch, Pitts.	43.00	43.00	43.00	47.00					

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel		Granite City, Ill.		Plates		Buffalo	
Hot Rolled		Middletown, O.		Sheets		Gulf ports	
Pittsburgh	2.00c	Youngstown, O.		Hot strip		Birmingham	
Chicago, Gary	2.00c	Pacific Coast points		Cold stp.		St. Louis, del.	
Cleveland	2.00c	Black Plate, No. 29 and Lighter				Pacific Coast po	
Detroit, del.	2.00c	Pittsburgh					
Buffalo	2.00c	Chicago, Gary					
Sparrows Point, Md.	2.00c	Granite City, Ill.					
New York, del.	2.24c	Long Ternes No. 24 Unassorted					
Philadelphia, del.	2.17c	Pittsburgh, Gary					
Granite City, Ill.	2.10c	Pacific Coast					
Middletown, O.	2.00c	Enamelling Sheets					
Youngstown, O.	2.00c	No. 10					
Birmingham	2.00c	No. 20					
Pacific Coast points	2.50c	Pittsburgh					
Cold Rolled		Chicago, Gary					
Pittsburgh	3.05c	Granite City, Ill.					
Chicago, Gary	3.05c	Youngstown, O.					
Buffalo	3.05c	Cleveland					
Cleveland	3.05c	Middletown, O.					
Detroit, delivered	3.15c	Pacific Coast					
Philadelphia, del.	3.37c	Corrosion and Heat-Resistant Alloys					
New York, del.	3.39c	<i>Pittsburgh base, cents per lb.</i>					
Granite City, Ill.	3.15c	Chrome-Nickel					
Middletown, O.	3.05c	No. 302					
Youngstown, O.	3.05c	No. 304					
Pacific Coast points	3.65c	Bars					
Galvanized No. 24		Plates					
Pittsburgh	3.50c	Sheets					
Chicago, Gary	3.50c	Hot strip					
Buffalo	3.50c	Cold strip					
Sparrows Point, Md.	3.50c	Straight Chromes					
Philadelphia, del.	3.67c	No. No. No. No.					
New York, delivered	3.74c	410 430 442 446					
Birmingham	3.50c	Bars					
		18.50 19.00 22.50 27.50					
		Steel Floor Plates					
		Chicago					
		Gulf ports					
		Pacific Coast ports					
		Pittsburgh					
		Standard Shapes					
		Pittsburgh					
		Philadelphia, del.					
		New York, del.					
		Boston, delivered					
		Bethlehem					
		Chicago					
		Cleveland, del.					
		Tin and Tin					
		Tin Plate, Coke					
		Pittsburgh, Gary					
		Granite City, Ill.					
		Mfg. Terns Plate					
		Pittsburgh, Gary					
		Granite City, Ill.					
		Bars					
		Soft					
		(Base, 3 to					
		Pittsburgh					
		Chicago or Gary					
		Duluth					
		Birmingham					
		Cleveland					
		Buffalo					
		Detroit, delivered					
		Philadelphia, del.					
		Boston, delivered					
		New York, del.					
		Gulf ports					
		Pacific Coast po					
		Rail					
		(Base, 15 to					
		Pittsburgh					
		Chicago or Gary					
		Detroit, delivered					
		Cleveland					

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malle- able	Basic	Besse- mer
Bethlehem, Pa.	\$22.00	\$22.50	\$21.50	\$23.00
Birdsboro, Pa.	22.00	22.50	21.50	23.00
Birmingham, Ala.†	17.38	.....	16.38	22.00
Buffalo	21.00	21.50	20.00	22.00
Chicago	21.00	21.00	20.50	21.50
Cleveland	21.00	21.00	20.50	21.50
Detroit	21.00	21.00	20.50	21.50
Duluth	21.50	21.50	.....	22.00
Erie, Pa.	21.00	21.50	20.50	22.00
Everett, Mass.	22.00	22.50	21.50	23.00
Granite City, Ill.	21.00	21.00	20.50	21.50
Hamilton, O.	21.00	21.00	20.50	.....
Neville Island, Pa.	21.00	21.00	20.50	21.50
Provo, Utah	19.00	.....	.....	.....
Sharpsville, Pa.	21.00	21.00	20.50	21.50
Sparrow's Point, Md.	22.00	.....	21.50	.....
Swedeland, Pa.	22.00	22.50	21.50	23.00
Toledo, O.	21.00	21.00	20.50	21.50
Youngstown, O.	21.00	21.00	20.50	21.50

†Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

Delivered from Basing Points:

Akron, O., from Cleveland.....	22.39	22.39	21.89	22.89
Baltimore from Birmingham.....	22.78	.....	21.66	.....
Boston from Birmingham.....	22.12	.....	.....	.....
Boston from Everett, Mass.	22.50	23.00	22.00	23.50
Boston from Buffalo	22.50	23.00	22.00	23.50
Brooklyn, N. Y., from Bethlehem	24.50	25.00	.....	.....
Canton, O., from Cleveland	22.39	22.39	21.89	22.89
Chicago from Birmingham	†21.22	.....	.....	.....
Cincinnati from Hamilton, O.	21.24	22.11	21.61	.....
Cincinnati from Birmingham.....	21.06	.....	20.06	.....
Cleveland from Birmingham.....	21.32	.....	20.82	.....
Mansfield, O., from Toledo, O.	22.94	22.94	22.44	22.44
Milwaukee from Chicago	22.10	22.10	21.60	22.60
Muskegon, Mich., from Chicago,	.....	.....	.....	.....
Toledo or Detroit	24.19	24.19	23.69	24.69
Newark, N. J., from Birmingham	23.15	.....	.....	.....
Newark, N. J., from Bethlehem ..	23.53	24.03	.....	.....
Philadelphia from Birmingham ..	22.46	.....	21.96	.....
Philadelphia from Swedeland, Pa.	22.84	23.34	22.34	.....
Pittsburgh district from Neville	.....	.....	.....	.....
Island .....	.....	.....	.....	.....
Saginaw, Mich., from Detroit ..	23.45	23.45	22.95	22.95

(Neville base, plus 69c, 84c, and \$1.24 freight.)

No. 2 Fdry.	Malle- able
21.50	21.50
21.12	.....
23.63	23.63

St. Louis, northern
St. Louis from Birmingham.....
St. Paul from Duluth

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Steelton, Pa., base; \$26.50, base; \$27.74 delivered Philadelphia.

Gray Forge

Valley furnace \$20.50
Pitts. dist. fur. 20.50

†Silvery

Jackson county, O., base: 6-6.50 per cent \$25.50; 7-7.50—\$26.50; 7.51-8—\$27.00; 8-8.50—\$27.50; 8.51-9-9.50—\$28.50; Buffalo, \$1.25 higher.

Bessemer Ferrosilicoint

Jackson county, O., base; Prices are the same as plus \$1 a ton.

†The lower all-rail delivered price from Jackson, O., is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicoint \$1 per ton add. Each unit over 3%, add \$1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices	Magnesite
Fire Clay Brick	Imported dead -
<i>Super Quality</i>	grains, net ton
Pa., Mo., Ky.	Chester, Pa., and
<i>First Quality</i>	timore bases (ba
Pa., Ill., Md., Mo., Ky.	Do. domestic
Alabama, Georgia.....	Do., f.o.b. Chev
New Jersey	Wash., net ton, M
<i>Second Quality</i>	net ton, bags
Pa., Ill., Ky., Md., Mo.	Quickset magn
Georgia, Alabama	grains, f.o.b. C
New Jersey	lah. Wash., net
<i>Ohio</i>	Basic Br
First quality	Net ton, f.o.b. Ba
Intermediate	mouth Meeting,
Second quality	Chrome brick
Malleable Bung Brick	Chem. bonded chro
All bases	Magnesite brick
Silica Brick	Chem. bonded mag
Pennsylvania	Fluorspar, 85
Joliet, E. Chicago	Washed gravel, t
Birmingham, Ala.	paid, tide, net
Ladle Brick	Washed gravel, f.o
(Pa., O., W. Va., Mo.)	Ky., net ton, car
Dry press	all rail
Wire cut	Do. barge
	No. 2 lump

Ferrolloy Prices

Ferromanganese, 78-82%,	bon, per lb. contained	carlots, contr., net ton.	contract, carlots
tidewater, duty pd.	chrome	Do, spot	¼-in., lb.
Do., del. Pittsburgh	Do., ton lots	Do, contract, ton lots	Do, 2%
Spiegeleisen, 19-21% dom.	Do., less-ton lots	Do, spot, ton lots....	Spot ¼c h
Palmerton, Pa., spot	Car- Ton Less	15-18% ti., 3-5% carbon,	Silicon Briquets, con
Do., 26-28%, Palmer	loads lots ton	carlots, contr., net ton	carloads freight
.....	2% carb... 16.50c 17.25c 17.50c	Do, spot	lowed, ton
Ferrosilicon, 50% freight	1% carb... 17.50c 18.25c 18.50c	Do, contract, ton lots	Carload, spot
allowed, c.l.	0.10% carb. 18.50c 19.25c 19.50c	Do, spot, ton lots....	Less-ton lots, lb.
Do., ton lot	0.20% carb. 19.50c 20.25c 20.50c	Alsiifer, contract carlots,	Manganese Briq
Do., 75 per cent.	Spot ¼c higher	f.o.b. Niagara Falls, lb.	contract carlos
Spot, \$5 a ton higher.	Ferromolybdenum, 55-	Do, ton lots	bulk freight al
Silicoman, 2% carbon ..	65% molyb. cont., f.o.b.	Do, less-ton lots	lb.
2% carbon, 93.00; 1%,	mill, lb.	Spot ¼c lb. higher	Ton lots
Contract ton price \$11	0.95	Chromium Briquets, con	Less-ton lots
higher; spot \$5 over	Calcium molybdate, lb.	tract, any quantity,	Spot ¼c hi
contract.	molyb. cont., f.o.b. mill	freight allowed, lb....	Zirconium Alloy, 12-
Ferrotungsten, stand., lb.	0.80	Do, spot carlots, bulk	contract, car
con. del. cars	Ferrotitanium, 40-45%,	Do, ton lots	gross ton
1.60-1.65	lb., con. ti., f.o.b. Niag-	Do, less-ton lots	Do, spot
Ferrovanadium, 35 to	ara Falls, ton lots....	1.25	34-40%, contract,
40%, lb., cont.	Do, less-ton lots	1.35	loads, lb., alloy..
2.70-2.80-2.90	20-25% carbon, 0.10	1.40	Do, ton lots
Ferrophosphorus, gr. ton,	max., ton lots, lb....	Spot 5c higher	Do, less-ton lots.
c.l., 17-18% Rockdale,	Do, less-ton lots	Ferrocolumbium, 50-60%	Spot ¼c hi
Tenn., basis, 18%, \$3	.....	contract, lb. con. col.,	Molybdenum Po
unitage, 58.50; electro-	Technical molybdenum	f.o.b. Niagara Falls....	99%, f.o.b. York
lytic, per ton, c. l., 23-	trioxide, 53 to 60% mo-	Do, less-ton lots	200-lb. kegs, lb.
26% f.o.b. Monsanto,	lybdenum, lb. molyb.	2.30	Do, 100-200 lb. b
Tenn., 24% \$3 unitage	cont., f.o.b. mill.	0.80	Do, under 100-lb.
75.00	Spot 1s 10c higher	Ferro-carbon-titanium, 15-	Molybdenum M
Ferrochrome, 66-70 chrom-	Technical molybdenum	18%, ti., 6-8% carb.,	Briquets, 48-52%
ium, 4-6 carbon, cts.	trioxide, 53 to 60% mo-	.....	lybdenum, per p
lb., contained cr., del.	lybdenum, lb. molyb.	.....	contained, f.o.b.
carlots	cont., f.o.b. mill. ....	.....	ducers' plant ..
10.50c	.....	.....	.....
Do., ton lots .....	.....	.....	.....
11.25c	.....	.....	.....
Do., less-ton lots .....	.....	.....	.....
11.50c	.....	.....	.....

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

[illegible]

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Rates of Exchange, June 1

ces f. o. b. Port of Dispatch—

Domestic Prices at Works or Furnace—

By Cable or Radio

Last Reported

		Continental Channel or North Sea ports, gross tons		Quoted in gold pounds sterling		£ s d		French Francs		Belgian Francs		Reich Mark	
		British gross tons U. K. ports		Quoted in dollars at current value		**Quoted in gold pounds sterling							
		£ s d				£ s d							
Sl...	\$23.40	5	0	0	\$18.32	2	3	0					
35-05	26.91	5	15	0*	17.15	2	0	3					
age...	\$34.52	7	0	6	\$38.34	4	10	0					
	53.24	11	7	6	42.60	5	0	0					
...	\$44.46	9	10	0	\$48.99	5	15	0					
...	2.30c	11	0	1.95c	to 1.98c	5	2	6	to 5	4	0		
...	2.09c	10	0	1.76c	to 1.85c	4	12	6	to 4	17	6		
...	5 mm.	10	18	9	2.14c	to 2.35c	5	12	6	to 6	2	6	
age	2.72c	13	0	2.95c		7	15	0*					
...	3.29c	15	0	3.52c		9	5	0					
corr.	2.77c	13	5	0	1.95c	to 2.00c	5	2	6	to 5	4	0	
...	4.08c	19	10	0	2.33c	to 2.76c	6	2	6	to 7	5	0	
base.	4.86c	23	5	0	2.99c	to 3.09c	7	17	6	to 8	2	6	
					2.66c	to 2.85c	7	0	0	to 7	10	0	
lb lbs.	\$ 4.74	1	0	3									

ngance \$80.00 delivered Atlantic seaboard duty-paid.

*Basic. †British ship-plates. Continental, bridge plates. \$24 ga. 11 to 3 mm. basic price. British quotations are for basic open-hearth steel. Continental usually for basic-besemer steel. (a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. *Close annealed. †Rebate of 15s on certain conditions.

**Gold pound sterling carries a premium of 75 per cent over paper sterling.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; † indicates brokers

HEAVY MELTING STEEL

Birmingham, No. 1.	†12.00
Bos. dock No. 1 exp.	13.75-14.00
New Eng. del. No. 1	14.00
Buffalo, No. 1, R. R.	13.50-14.00
Buffalo, No. 1	13.00-13.50
Buffalo, No. 2	11.00-11.50
Chicago, No. 1	12.50-13.00
Chicago, auto, no alloy	11.25-11.75
Chicago, No. 2 auto	10.50-11.00
Cincinnati, dealers.	10.50-11.00
Cleveland, No. 1.	13.75-14.25
Cleveland, No. 2.	12.50-13.00
Detroit, No. 1	9.00-9.50
Detroit, No. 2	8.50-9.00
Eastern Pa., No. 1.	15.00-15.50
Eastern Pa., No. 2.	12.50-13.00
Federal, Ill.	11.50-12.00
Granite City, R. R.	11.50-12.00
Granite City, No. 2.	10.50-11.00
Los Angeles, No. 1.	13.00-14.00
Los Angeles, No. 2.	12.00-13.00
N. Y. dock No. 1 exp.	12.00-12.50
Pitts., No. 1 (R. R.)	15.50-16.00
Pittsburgh, No. 1.	14.00-14.50
Pittsburgh, No. 2.	12.50-13.00
St. Louis, R. R.	12.00-12.50
St. Louis, No. 2.	10.50-11.00
San Francisco, No. 1	13.00-13.50
Seattle, No. 1	11.00-12.00
Toronto, dtrs. No. 1.	9.25-9.75
Valleys, No. 1	14.50-15.00

COMPRESSED SHEETS

Buffalo	11.00-11.50
Chicago, factory	12.00-12.50
Chicago, dealers.	10.75-11.25
Cincinnati dealers.	10.00-10.50
Cleveland	13.75-14.25
Detroit	10.25-10.75
E. Pa., new mat.	15.00-15.50
E. Pa., old mat.	11.00-11.50
Los Angeles	14.00-14.50
Pittsburgh	14.00-14.50
St. Louis	9.50-10.00
Valleys	14.00-14.50

BUNDLED SHEETS

Buffalo, No. 1	11.00-11.50
Buffalo, No. 2	10.00-10.50
Cleveland	9.50-10.00
Los Angeles	14.00
Pittsburgh	12.50-13.00
St. Louis	7.00-7.50
Toronto, dealers.	8.00-8.50

SHEET CLIPPINGS, LOOSE

Chicago	8.00-8.50
Cincinnati, dealers.	6.00-6.50
Detroit	7.00-7.50
†Los Angeles	3.75-4.00
St. Louis	6.00-6.50
Toronto, dealers.	4.25-4.75

BUSHELING

Buffalo, No. 1	11.00-11.50
Chicago, No. 1	11.25-11.75
Cincin., No. 1, deal.	7.00-7.50
Cincinnati, No. 2.	1.75-2.25
Cleveland, No. 2.	7.50-8.00
Detroit, No. 1, new.	9.50-10.00
Valleys, new, No. 1.	13.50-14.00
Toronto, dealers.	3.75-4.25

MACHINE TURNINGS (Long)

Birmingham	†4.50-5.00
Buffalo	6.00-6.50
Chicago	6.50-7.00
Cincinnati, dealers.	4.00-4.50

Cleveland	7.00-7.50
Detroit	4.25-4.75
Eastern Pa.	8.50
Los Angeles	4.50-5.00
New York	†3.50-4.00
Pittsburgh	8.00-8.50
St. Louis	3.50-4.00
Toronto, dealers.	4.25-4.75
Valleys	9.00-9.50

SHOVELING TURNINGS

Buffalo	7.25-7.75
Cleveland	7.50-8.00
Chicago	7.50-8.00
Detroit	5.25-5.75
Pitts., alloy-free.	9.50-10.00

BORINGS AND TURNINGS

For Blast Furnace Use

Boston district	2.00
Buffalo	6.75-7.25
Cincinnati, dealers.	2.75-3.25
Cleveland	7.50-8.00
Eastern Pa.	6.50-7.00
Detroit	4.75-5.25
New York	†2.50-3.00
Pittsburgh	6.50-7.00
Toronto, dealers.	3.50-4.00

AXLE TURNINGS

Boston district	†7.50
Buffalo	9.50-10.00
Chicago, elec. fur.	12.50-13.00
East. Pa., elec. fur.	13.00-13.50
St. Louis	9.00-9.50
Toronto	4.00-4.25

CAST IRON BORINGS

Birmingham	†6.00-6.50
Boston dist. chem.	†4.50
Buffalo	6.75-7.25
Chicago	6.25-6.75
Cincinnati, dealers.	2.75-3.25
Cleveland	7.50-8.00
Detroit	4.75-5.25
E. Pa., chemical	10.00-11.00
New York	†3.50-4.00
St. Louis	2.50-3.00
Toronto, dealers.	3.75-4.25

RAILROAD SPECIALTIES

Chicago	14.50-15.00
---------	-------------

ANGLE BARS—STEEL

Chicago	15.00-15.50
St. Louis	13.00-13.50

SPRINGS

Buffalo	15.50-16.00
Chicago, coil	15.50-16.00
Chicago, leaf	14.50-15.00
Eastern Pa.	17.00-17.50
Pittsburgh	17.00-17.50
St. Louis	14.00-14.50

STEEL RAILS, SHORT

Birmingham	†12.00-12.50
Buffalo	16.50-17.00
Chicago (3 ft.)	15.50-16.00
Chicago (2 ft.)	16.00-16.50
Cincinnati, dealers.	16.25-16.75
Detroit	16.00-16.50
Los Angeles	15.00-15.50
Pitts., 3 ft. and less	17.00-17.50
St. Louis, 2 ft. & less	16.25-16.75

STEEL RAILS, SCRAP

Boston district	†13.50-14.00
Buffalo	15.50-16.00
Chicago	13.00-13.50
Cleveland	16.00-16.50

Pittsburgh	15.50-16.00
St. Louis	13.00-13.50
Seattle	16.00

FROGS, SWITCHES

Chicago	12.50-13.00
St. Louis, cut	13.00-13.50

ARCH BARS, TRANSOMS

St. Louis	13.50-14.00
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PIPE AND FLUES

Chicago, net	7.50-8.00
Cincinnati, dealers.	6.00-6.50

RAILROAD GRATE BARS

Buffalo	9.00-9.50
Chicago, net	7.50-8.00
Cincinnati, dealers.	5.75-6.25
Eastern Pa.	12.50
New York	†8.50-9.00
St. Louis	8.00-8.50

RAILROAD WROUGHT

Birmingham	†11.00-11.50
Boston district	†9.50-10.00
Eastern Pa., No. 1.	16.00-16.50
St. Louis, No. 1	9.75-10.25
St. Louis, No. 2	11.50-12.00

FORGE FLASHINGS

Boston district	†7.50
Buffalo	11.00-11.50
Cleveland	11.00-11.50
Detroit	8.50-9.00
Los Angeles	9.00
Pittsburgh	12.50-13.00

FORGE SCRAP

Boston district	†6.50
Chicago, heavy	15.50-16.00

LOW PHOSPHORUS

Cleveland, crops.	17.50-18.00
Eastern Pa., crops.	17.00-17.50
Pitts., billet, bloom, slab crops	18.00-18.50

LOW PHOS. PUNCHINGS

Buffalo	15.50-16.00
Chicago	15.50-16.00
Eastern Pa., crops.	17.50-18.00
Pittsburgh	17.00-17.50
Seattle	15.00

RAILS FOR ROLLING

5 feet and over

Birmingham	†14.00-15.00
Boston	15.00-15.50
Chicago	17.00-17.50
New York	†14.00-14.50
Eastern Pa.	17.00-17.50
St. Louis	16.00-16.50

STEEL CAR AXLES

Birmingham	†15.00-16.00
Boston district	†14.50
Chicago, net	17.50-18.00
Eastern Pa.	20.50-21.00
St. Louis	17.00-17.50

LOCOMOTIVE TIRES

Chicago (cut)	15.00-15.50
St. Louis, No. 1	12.25-12.75

SHAFTING

Boston district	†15.25-15.50
New York	†15.50-16.00

Eastern Pa.	
St. Louis, 1 1/4-3/4	

CAR WHEELS

Birmingham	
Boston dist., iron	
Buffalo, steel	
Chicago, iron	
Chicago, rolled steel	
Cincin., iron, deal	
Eastern Pa., iron	
Eastern Pa., steel	
Pittsburgh, iron	
Pittsburgh, steel	
St. Louis, iron	
St. Louis, iron	

NO. 1 CAST SCRAP

Birmingham	
Boston, No. 1 mach.	
N. Eng. del. No. 2	
N. Eng. del. text.	
Buffalo, cupola	
Buffalo, mach.	
Chicago, agri. net	
Chicago, auto net	
Chicago, railroad	
Chicago, mach. net	
Cincin., mach. deal	
Cleveland, mach.	
Detroit, cupola, net	
Eastern Pa., cupol	
E. Pa., mixed vari	
Los Angeles, net	
Pittsburgh, cupola	
San Francisco, del	
Seattle	
St. Louis, cupola	
St. Louis, agri. mach	
St. L., No. 1 mach.	
Toronto, No. 1, mach., net	

HEAVY CAST

Boston dist. break	
New England, del.	
Buffalo, break	
Cleveland, break, net	
Detroit, auto net	
Detroit, break	
Eastern Pa.	
Los Ang., auto, net	
New York, break	
Pittsburgh, break	

STOVE PLATE

Birmingham	
Boston district	
Buffalo	
Chicago, net	
Cincinnati, dealers	
Detroit, net	
Eastern Pa.	
New York, fdy.	
St. Louis	
Toronto dealers, net	

MALLEABLE

Birmingham, R. R.	
New England, del.	
Buffalo	
Chicago, R. R.	
Cincin., agri., deal.	
Cleveland, rail	
Eastern Pa., R. R.	
Los Angeles	
Pittsburgh, rail	
St. Louis, R. R.	

molybdenum contained, f.o.b. mill

Manganese

Prices not including per unit charge

Caucasian, 50-52% nom.	
So. African, 50-52% nom.	
Indian, 49-50% nom.	

Iron Ore

Lake Superior Ore

Gross ton, 5 1/2 %

Lower Lake Ports

Old range bessemer	\$5.25
Mesabi nonbessemer	4.95
High phosphorus	4.85
Mesabi bessemer	5.10
Old range nonbessemer	5.10

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic	
56.63% con.	9.00-9.25
Cop.-free low phos.	
58-60%	nominal

Foreign Ore

<i>Cents per unit, c.i.f. Atlantic</i>	
Foreign manganiferous ore, 45.55% iron, 6-10% man.	
nom.	12.00

No. Afr. low phos.	12.00
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Swedish low phos.	12.00
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Spanish No. Africa basic, 50 to 60% nom.	10.00-10.50
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Tungsten, sh. ton unit, duty pd. nom.	19.00-19.50
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N. F., fdy., 55%	7.00
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Chrome ore, 48% gross ton, c.i.f.	\$23.00-24.00
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Molybdenum ores sulphide, per lb.	
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Strip

Strip Prices, Pages 82, 83

Production of flat-rolled up further to slightly percent for common and 30 per cent for special factors contribute small drop in galvanized 54 per cent. Releases bookings still are increasing gradually. is quiet. Prices now firm except in gal-

Some sheet releases for new automobile parts and shipments to other are heavier. Possibility mill schedules next depends on how much pressures exert on buyers to material ordered recently concessions. New business strip is light.

Sheet orders are small. moderate coverage ago, most large companies buying little. Jobbers are pressing for several grades. Small is slower. Sheet prices higher at new levels but subject to much test.

Shipping releases on booked at recent low prices, mills in most in- straining to clear this volume possible. Such business was smaller than in the buying is light and some shading under current is noted.

Assumption is fair but makers of household probably most active. Ap- domestic refrigerators cent lighter than a year the four-month total 37 ad of last year.

Philadelphia—Specifications ent bookings are heavier ted and some smaller apparently will have most of their low-price the end of June. Prices being scrutinized closely believed new levels are fairly well. In effect, functional allowances still made to jobbers on gal-

Sheet and strip pro- slightly heavier as a re- leases against old orders. g is light, being mostly ellaneous nature. Auto- ments continue restrict-

Automotive specifica- to reflect recent heavy at makers of household



UNCHANGING -- BUT PROFITS NOT REQUIRED

All of us have frequently heard of the unchanging ruggedness of the "Old Man of the Mountain." The sight of his face is im- pressive but

Do you realize that many industrial plants today seem to be emulating the "Great Stone Face"? They have remained practically un- changed for years and have no particular intention of doing otherwise in the im- mediate future. As might be expected, they are continu- ally wondering why profits cease any longer to make their appearance.

In other words, stability is carried much too far when it is applied to the machine

tools in use in many plants. Design changes have been so rapid that the manufact- urer who expects to survive cannot afford to use yester- day's equipment.

For example, a large printing press manufacturer has just reported that a re- cently purchased Landis grinder will pay for itself in one year on the basis of full time operation. This organ- ization is a very successful one. Do you think it would be equally so if its equip- ment were kept as un- changed as the "Old Man of the Mountain"? 295

LANDIS TOOL CO.
WAYNESBORO, PENNA.



INVEST IN LANDIS

equipment and miscellaneous consumers are taking steady shipments. New business is light, influenced by previous coverage and by the holiday.

St. Louis — Sheet and strip buying is slow following recent heavy coverage. Galvanized roofing is more active than some other grades, but enameling stock is slower in both new orders and shipments.

The C. T. Hill organization has been incorporated as the Pacific Railway Equipment Co., Slauson and Eastern avenues, Los Angeles.

Plates

Plate Prices, Page 82

Cleveland — Plate business has been steady lately, May bookings comparing favorably with April. A large part of the demand has been in light gages for miscellaneous uses, with some tonnage being for structural and ship repair work. The local shops of the New York Central plans to reopen later this month.

Chicago—Some railroad plate de-

mand for equipment re-
pairing, while bridge
work is lending consid-
erable support to the market. A
line project booked by a
est will require nearly
plates.

Boston — Plate buying
Prices are somewhat
shading has not entire-
ly appeared. This takes
the waiving of some extras
and concessions rather than
cutting. Shipyard re-
quires steady, contracts including
for a siphon, Chelsea
ton. Fabricating shop
slack.

New York — Plates
steady at 2.29c, delivered
receiving little test. In
cent buying at price
sellers look for quiet
business June. A possible
expansion tonnage, in view of
the navy of eight destr-
oys and eight submarines. These
about 9500 tons of steel
plates. Railroad specifica-
tions may be heavier with the
need of repair work at a number
of places that were closed during
mining suspension. Tank
work is light. The marine
mission shortly will take
merchant ships, taking about
tons of steel, largely plate.

Philadelphia—Some skept-
icism evidenced over probability
of 2.10c base on plates
through third quarter in
the 2.00c price on hot-rolled
but mills point out im-
provement in sheet manufacturing
justify the present dis-
count. Meanwhile, plate business
is to be taken at the 2.10c
base, including tonnage
for building, boiler and pressure
fabrication and warehouse
inquiry for repairs to
sylvania railroad locomotives
awaited.

Birmingham, Ala. — Steel
and miscellaneous construction
resulted in slightly improved
look for plates. A large volume
this business is in prospect
now are among the most
the heavier items.

Seattle — The plate market
quiet, local shops having some
cellaneous contracts involving
than 100 tons each. No large
tonnages are in prospect.
tion bureau, Denver, plans
bids soon for No. 2 and No. 3
ways, Roza diversion pro-
ject, tonnage unstated.

San Francisco — Little
movement is noted in demand
and only one project over
was reported placed. So far
year 16,655 tons have been



PRECISION to less than .001 inch

● Horsburgh & Scott Worms are ground within an accuracy of .001" in lead, indexing and contour... a precision in manufacturing that insures higher efficiency, longer life and quieter operation. To obtain these exceedingly close limits, this company developed its own exclusive grinding machines. These machines plus precision inspection fixtures are your guarantee of the finest worms and gears possible.

A 448 page catalog is yours without obligation.

THE HORSBURGH & SCOTT CO.

GEARS AND SPEED REDUCERS

5112 HAMILTON AVENUE, CLEVELAND, OHIO, U. S. A.

with 14,131 tons for the
year ago.

Contracts Placed

iphon, Chelsea creek, Bos-
titan district commission
Steel Co.

h steel water pipe, New-
National Tube Co., Pitts-

pipe, Warren, O., to War-
& Boiler Co., Warren, O.

holder for Hercules Pow-
Francisco, to Steel Tank
Berkeley, Calif.

id barge pontoons, Wash-
department, to American
Pittsburgh.

Contracts Pending

rock, Elephant Butte power
Grande project, N. Mex.,
1217-D; bids opened.

Prices, Page 82

—Carbon and alloy bar
slightly heavier. Ship-
are on spot orders
needs. New business
motive interests is re-
ly large but is not ex-
e shipped in large vol-
umber of weeks. Prices

—Bar business is well
May bookings being a
of April. Initial demand
del automobile material
to appear from forgers.
ets of farm equipment
ve improved moderately
eeks, operations of this
eg aided by relatively
s of finished machines in
ions. Bar demand from
is users is steady or up

Merchant bar demand
ially unchanged, with
tion expected in the next
Large buyers are pur-
most entirely for fill-in
ad range of miscellane-
s are chiefly supporting
mand. Agricultural re-
are expected to taper
to a low point by the end
th.

Alloy steel bars are rela-
e active than carbon
both are far from brisk.
spotty and generally in
Consumption is down
Shipbuilding and chain-
requirements are main-
h some increase in alloy
the latter. Forging bars

— Alloy bar specifica-

tions from government shops and
airplane builders continue outstand-
ing. Better activity at railroad
shops as yet has not influenced bar
demand. Small buyers are receiv-
ing the benefit of the lower base
price, while the net increase of \$1
a ton to larger consumers, result-
ing from elimination of quantity dif-
ferentials, does not go into effect
until July 1.

Buffalo—Bar production shows
resistance to any tapering off as
summer months approach. Build-
ing requirements are giving the
strongest support to operations,

with some output being used to
augment mill stocks. No large or-
ders have appeared yet from motor
manufacturers.

Philadelphia — Warehouses are
placing small orders for bars but
demand generally is none too active.
Forging quality material is moving
fairly well, especially to shops with
government orders.

Birmingham, Ala.—Bar business,
composed largely of demand for
concrete reinforcing, is relatively
satisfactory. An active business is
developing from miscellaneous proj-
ects.

Production Costs Go Down

When you do away with oils that drip and leak,
requiring frequent re-application. Oils fail to in-
sure dependable lubrication. Bearings run hot and
waste power—costly breakdowns due to failure
of worn parts raise maintenance costs. **NON-
FLUID OIL** stops such losses. Does not drip or
leak, lubricates dependably and stays where put
until entirely consumed. Outlasts oil 3 to 5 times.

Used regularly by leading steel plants. Tests
under actual working conditions proved **NON-
FLUID OIL** saved money.

Send for testing sample today—prepaid. NO CHARGE!

NEW YORK & NEW JERSEY LUBRICANT CO.

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Greenville, S. C.



MODERN STEEL MILL LUBRICANT

Better Lubrication at Less Cost per Month

Pipe

Pipe Prices, Page 83

Pittsburgh—A moderate recovery is looked for in pipe business this month, following a slight letdown in May. Better activity is anticipated in both oil country goods and standard pipe. Railroad locomotive repairs have stimulated boiler tube demand, part of which will carry over into June. Mechanical tubing needs of the automotive industry are counted on to improve

the next few weeks, May business having been scant.

Cleveland—Standard steel pipe bookings hold at the level of the past several weeks, the May total showing little change from April. Casing demand also was steady, with line pipe tonnage heavier. Cast pipe business declined, and the smaller volume of inquiries precludes any marked recovery this month.

Boston — Cast pipe buying continues to hold up well, maintaining operations at the district foundry around five days per week. The bulk of early season laying require-

ments have been placed. demand has slackened. wrought pipe is slow. both the latter through are generally maintained spots in Connecticut.

New York—Cast pipe confined mostly to small few large inquiries are are slightly weaker, con \$2 a ton being noted.

Birmingham, Ala. — business in pipe continue tain production at a rela mark. Some tonnage has ized from the west coast. 775 tons divided between ducers, and Florida mu have taken a sizable lot weeks.

Seattle — Award of 120 cast iron pipe to French by Yakima, Wash., fea market last week. For project, 125 tons of 16-in. H. G. Purcell, Seattle Pipe & Foundry Co., N. J., valves to Renssel Co., and hydrants to R. & Co. N. Coluccio & Co is low for the Garfield st ect, Seattle, calling for 70 8 to 12 inch pipe, Rensse for valves.

San Francisco — Inter iron pipe centers around opened on 1750 tons for municipal utility district. Calif., and on 234 tons for Ariz. No awards of size ported placed but pending exceeds 5400 tons. To date, 11,254 tons have been book pared with 13,842 tons for responding period in 1938.

Cast Pipe Placed

1200 tons, 8 to 12-inch, to Wash., to French interests by Pacific Water Works S Seattle.

500 tons, North Beach airport to Warren Foundry & Pipe lipsburg, N. J., through pr division, treasury departmen

160 tons, 6-inch for Spokane, Pacific States Pipe Co., Prov

125 tons, 16-inch, for Yakim to H. G. Purcell, Seattle, f States Pipe & Foundry Co. ton, N. J.

Cast Pipe Pending

234 tons, 2 to 8-inch, Tucson, opened.

700 tons, Garfield street imp Seattle; N. Coluccio & Co general contract.

Tin Plate

Tin Plate Prices, Page

Tin plate operations are 70 per cent. Specifications



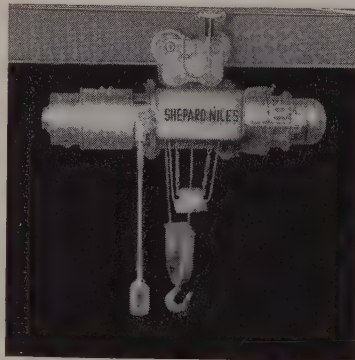
Push button control

**MULTIPLE OR SINGLE SPEED
for ELECTRIC CRANES
AND HOISTS**

SHEPARD NILES multiple speed push button control provides 5 selective speeds by one push button for each travel motion. Each button as it is pressed inward makes five electrical contacts, corresponding to five independent speeds in each direction of travel.

Push button master switch cases are of aluminum alloy and made slender enough to be grasped easily with the hand. An assembly of two or three master switches in tandem can be furnished for the control of 2-motor and 3-motor cranes and hoists. An emergency stop switch is provided at the lower end of the assembly.

Shepard Niles multiple speed push button control for all 6 travel motions applied to 3-motorelectric traveling crane.



Shepard Niles LiftAbout equipped with single speed push button control.

**A
COMPLETE
LINE OF
CRANES &
HOISTS**

SHEPARD NILES
CRANE & HOIST CORP.

358 SCHUYLER AVENUE...MONTOUR FALLS, N. Y.

Wire prices are generally steady.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 83

Bolt and nut prices generally are being reaffirmed for third quarter. However, one producer has announced for June only a 5 per cent reduction in quotations to the wholesale hardware, jobbing and mill supply trade. This deduction is in recognition of certain irregularities in prices named to these distributors.

Shapes

Structural Shape Prices, Page 82

Pittsburgh — Private work is coming out in better volume than at any time the past two years. About half of new inquiries is private construction, with total volume large. Largest of the new inquiries involves 2200 tons for a library building, Richmond, Va., for the state.

Cleveland — Largest award went to Mt. Vernon Bridge Co., Mt. Vernon, O., for the Erie avenue bridge

Cars

Material Prices, Page 83

the Western Maryland of 1110 freight cars will be opened June bright spot in the inquiry calls for 100 box and hopper cars, and 10 flat cars. A railroad has placed 50 Magor Car Corp., Pas-

ing by carriers is con- materials, which are ed well. Rail backlogs worked down until the program is seen, with no in sight.

Cars Placed

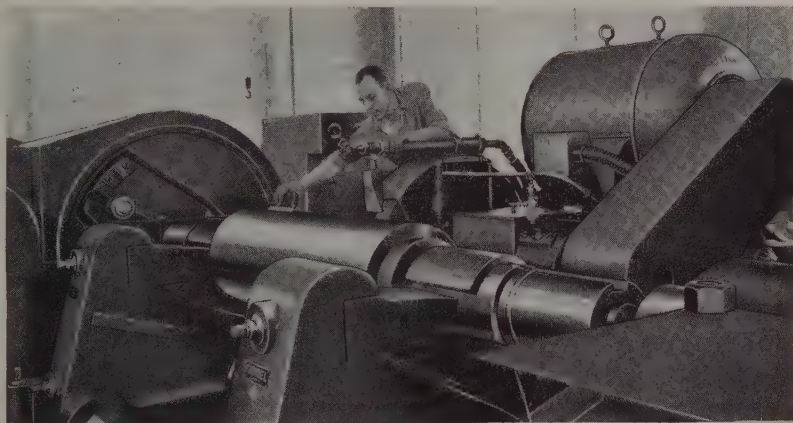
Pacifico, Cotsa Rica, 50 box for Car Corp., Passaic, N. J.

Cars Pending

land, maximum of 1110 50-ton capacity; 100 to and hoppers, 100 drop-end 10 flat cars; bids June 22.

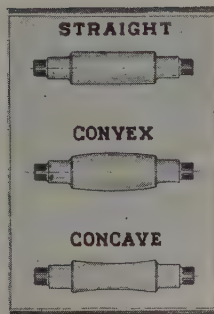
Booked

& Foundry Motors Co., Ten motor coaches, for Electric Co., Houston, Tex.; order to total of 40



FARREL ROLL GRINDERS

Permit Close Control of Roll Accuracy and Finish



In the Farrel Roll Grinder roll shape is automatically controlled. Straight, convex or concave contours are ground exactly symmetrical on both halves of the roll.

For full information send for copy of Bulletin No. 111.

Due to the automatic and semi-automatic features of the Farrel Heavy Duty Roll Grinder, roll accuracy and finish can be closely controlled to meet predetermined standards. Dependence on the operator's skill to produce rolls of close accuracy and fine finish is reduced to the minimum.

With Farrel Heavy Duty Roll Grinders, rolls of any material can be ground with extreme precision, and any finish can be obtained which is possible to secure with wheels now available. These grinders do heavy roughing or fine finishing equally well. They will grind straight, convex or concave contours to exact symmetry and accuracy, and produce a perfect surface free from marks of any kind.

This close control of roll accuracy and finish makes possible the production of rolled metal strip and sheet with better quality surface and more accurate gauge.



FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.

New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

superstructure, Lorain, O. Bids are due June 15 on 1500 tons for the upper West Third street bridge, over the Cuyahoga river, here. A number of state bridge jobs bid May 26 are to be readvertised. Prices remain weak.

Chicago — Inquiries are lighter than a month ago, but recent awards and inquiries involving more than 100 tons each show an upturn in number. Illinois state highway department received bids last week on 8 bridges involving 900 tons.

Boston — Although awards continue light, miscellaneous inquiry is

up slightly. Vermont still has bridge needs aggregating 300 tons up for estimates, which together with scattered other spans in New England, approximate 550 tons. District fabricating shops are operating with small backlogs.

Buffalo — Principal interest is focused on several substantial pending jobs. Topping the list is 4000 tons for the new convention hall here on which foundation work is being completed. An award is expected soon on the Commodore Perry housing project involving more than 1200 tons of reinforcing bars and

joists and 375 tons of
New York — Inquiry heavier, notably for projects, viaducts and former in New York close to 5000 tons. Bridge Jersey require about Contracts are also immoderately, but with few nages involved. Fabrications continue low.

April fabricated structures bookings were the largest according to reports to American Institute of Steel Construction amounting to 116,801 tons in 95,065 in March and 91,000 in April, 1938. April shipments below March, totaling 100,038 tons in April last compared with 125,259 in four months this year below 44.4 per cent of the average bookings for the first five of the years 1923-1925.

Philadelphia — Arms Co., Lancaster, Pa., takes 5 on a warehouse requiring 1000 tons. Several small before the trade but total disappointing. Pittsburgh Moines Steel Co., Pittsburgh awarded 1560 tons for Navy N. H., navy yard, welded tion.

Seattle — Isaacson Iron Seattle, is low and will awarded 1508 tons for the bridge, Seattle.

San Francisco — Where were the largest in over inquiries remain exceptional. Largest inquiry calls for of bearing piles for the States Engineer office, Louisiana bids in. Awards aggregating 59,920 tons compared with 59,920 tons in 1938.

St. Louis — The American Co. booked 11,000 tons for over the Mississippi river, Miss., and 9000 tons Bethlehem Steel Co. for Natchez, Miss. Otherwise lettings were made, totaling 350 tons.



Shafer CONCAVE rollers and convex races provide inherent self-alignment and generous radial-thrust capacity in a simple and compact bearing assembly. These features permit many simplified, economical installations. Self-alignment automatically compensates for misalignment and shaft deflection; makes precise installation unnecessary.

SHAFAER BEARING CORPORATION
35 East Wacker Drive, Chicago



SHAFAER *Self-Aligning*
ROLLER BEARINGS

Shape Awards Con

Week ended June 3	.....
Week ended May 27	.....
Week ended May 20	.....
This week, 1938	.....
Weekly average, year, 1938	.....
Weekly average, 1939	.....
Weekly average, April	.....
Total to date, 1938	.....
Total to date, 1939	.....
Includes awards of 100 tons or more	

—The Market Week—

Contracts Placed

Beach, Calif to unnamed interest.

250 tons, highway bridge over Fox river, Eureka, Wis., to Wisconsin Bridge & Iron Co., Milwaukee.

240 tons, residence hall for women, University of Maine, Orono, Me., to Lyons Iron Works, Manchester, N. H.

235 tons, addition, U. S. Gypsum Co., New Brighton, Staten Island, N. Y., to Fort Pitt Bridge Works, Pittsburgh; Turner Construction Co., New York, general contractor.

229 tons, five bridges, Arapahoe county, Colorado, to unnamed interest.

225 tons, industrial building, Bristol, Pa., to Bethlehem Steel Co., Bethlehem, Pa.; through Frank V. Warren Inc., Bristol, general contractor.

220 tons, Mills bridge, Tillamook county, Oregon, to unnamed interest.

205 tons, bridge FAGM-487-B, Ellis county, Texas, to Virginia Bridge Co., Roanoke, Va.

205 tons, bridge FAGM 236, Portage, Wis., to Milwaukee Bridge Co., Milwaukee.

180 tons, Archer-Daniels, Midland building, Decatur, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

175 tons, factory building, Kilian Mfg. Co., Syracuse, N. Y., to Syracuse Engineering Co., Syracuse, N. Y.

175 tons, Laurel Hill tunnel, Somerset, Pa., Pennsylvania turnpike commission, to Republic Steel Corp., Cleveland.

bridge, Greenville, Miss., to American Bridge Co., Pittsburgh.

bridge over Mississippi river, Miss., for city, to Bethlehem Steel Co., Bethlehem, Pa.

duct, Belt parkway project, Queens, N. Y., to American Steel Co., Pittsburgh; through P. T. Construction Co., New York.

sacramento river and Doney bridge, Central Valley project, Bethlehem Steel Co., San Francisco.

superstructure, Erie avenue bridge, O., to Mt. Vernon Bridge Co., Akron, O.

nurses' home, Medical Center, N. J., to Lehigh Structural Steel Co., Allentown, Pa.

addition to Tulane university building, New Orleans, to G. C. Doullout Co., New Orleans.

ship fitters' shop, Portsmouth, N. H., to Pittsburgh-Des Moines Steel Co., Pittsburgh, welded construction.

addition, Erasmus Hall high school, Brooklyn, N. Y., to Lehigh Steel Co., Allentown, Pa.; through J. J. Heller, New York, general contractor.

grade crossing elimination, railroad, Huguenot, Staten Island, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.

Rayton avenue bridge, United States engineer office, Los Angeles, to American Bridge & Iron Works, Los Angeles.

Wilson Square Boys' club, 312 West 12th street, New York, to Bethlehem Steel Co., New York; Bethlehem Steel Co., New York, general contractor.

power house, Central Illinois Electric Corp., Hutsonville, Ill., to Mississippi Valley Structural Steel Co., Decatur, Ill.

bridge 1806, Caddo parish, Louisiana, to Laughlin Steel Corp., Houston, Tex.

bridge, Mission street, Pittsburgh, to Bethlehem Steel Co., Bethlehem, Pa.

Alsea Village development, Astoria, N. J., to Keystone Structural Steel Co., Trenton, N. J.; through J. J. Heller, Trenton.

Mem Boys' club, West 134th street, New York, to Harris Structural Steel Co., New York; A. L. Hartridge & Co., New York, general contractor.

organized towers and extension, aero authority, Washington, to American Bridge Co., Pittsburgh.

school, Middletown, N. Y., to Bethlehem Steel Co., Pittsburgh.

ory building, B. La Rosa Co., Conn., to Lehigh Structural Steel Co., Allentown, Pa.; Leo F. W. Haven, construction engineer.

on street viaduct, St. Paul, Minn., to Bethlehem Steel Co., Bethlehem, Pa.

oil, Eden, N. Y., to Ernst & Young Inc., Buffalo.

oil derricks, for Long Development Co., Long Beach, Calif.

Iron and Steel Sheets

FOR EVERY INDUSTRIAL REQUIREMENT

The Newport Rolling Mill Company facilities are devoted solely to the manufacture of high quality iron and steel sheets, with every step in production under the direction of a single management group. Thus Newport users are assured of uniformly dependable quality sheets, each made to best serve its specific purpose. It is to your profitable advantage to be satisfied with nothing less than Newport quality and Newport superior service.

Hot Rolled Sheets • Cold Rolled Sheets • Newport Electrical Sheets • GOHI Pure Iron-Copper Alloy Sheets • Globe Brand Galvanized Steel Sheets • GOHI Enameling Iron Sheets • KCB Copper Steel Sheets • Newport Long Terne Sheets • Newport Galvannealed and DeLuxe Metal Sheets.

Producers of High Grade Iron and Steel Sheets Since 1891

THE NEWPORT ROLLING MILL CO.
DIVISION OF
THE ANDREWS STEEL CO.
NEWPORT KENTUCKY

ANDREWS PRODUCTS in carbon and alloy steel: Blooms • Forging Billets • Re-rolling Billets • Slabs • Universal Mill Plates • Sheet Bars.

—The Market Week—

165 tons, beam bridges, Gettysburg and LaPlant, S. Dak., for U. S. department of interior, to Bethlehem Steel Co., Bethlehem, Pa.

153 tons, under-crossing, Sixth avenue, Seattle, to unnamed interest.

150 tons, state bridge 53.80, Casselton, N. Dak., to Minneapolis-Moline Power Implement Co., Minneapolis.

150 tons, residence, E. I. du Pont de Nemours & Co., Wilmington, Del., to Bethlehem Fabricators Inc., Bethlehem, Pa.; through Turner Construction Co., Philadelphia.

150 tons, power plant addition, Worthington, Minn., for city, to Minneapolis-

Moline Power Implement Co., Minneapolis.

130 tons, building, McCrory Stores Corp., Cumberland, Md., to Levinson Steel Co., Pittsburgh.

105 tons, transfer table, Chicago, Milwaukee, St. Paul & Pacific railroad, to Wilson Bridge & Iron Co., Milwaukee.

105 tons, transmission towers, Buchanan dam, Lower Colorado river authority, to Muskogee Iron Works, Muskogee, Okla.

Unstated tonnage, cell block addition and locking equipment, McNeil federal prison, Washington state, to unstated interest.

Shape Contracts Pe

3210 tons, William Howard school, Bronx, N. Y.; William Co., New York, low.

2200 tons, library building Va., for state.

1455 tons, Lewis river bridge, Cowlitz county, Washington; bids canceled.

1047 tons, state bridges, Clinton and Allegheny counties, Pa.; bids June 21.

1000 tons, warehouse, West Co., Bronx, N. Y.

1000 tons, warehouse, Armstrong Co., Lancaster, Pa.; bids June 21.

900 tons, highway bridges, Idaho; bids in.

900 tons, new driveway bridge, Motor Co., Dearborn, Mich.

800 tons, state bridge over Cecil county, Maryland.

725 tons, five bridges, Chicago, for state.

500 tons, machine shop, Foundry Co., Lima, O.

500 tons, buildings, for Intervester Co., Harrisburg, Pa.

400 tons, public school No. 1, bids June 13.

400 tons, store building addition, Foreman Co., Rochester.

350 tons, civic auditorium, Mont.; G. C. Boesflug, Milwaukee on general contract, at low.

350 tons, bridge approach, for Allegheny county, Pennsylvania.

300 tons, freight car hauler, Seatrain Lines Inc., Texas.

300 tons, state highway bridge, Alton, Ill.

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300 tons, state highway bridge, Alton, Ill.

LEADERSHIP



To achieve and hold leadership for nearly a century in the manufacture of a single product, requires constant progressiveness in manufacturing methods and processes, in management policies and trade relations. R B & W has always pioneered

in developing faster and more accurate machines for the production of bolts, nuts and rivets—led the way in developing new and better materials and finishes. It has set and achieved ever rising standards of strength, uniformity and accuracy. Today, in three complete plants, modern machinery and equipment operated by skilled workers assure unfailing quality.

Leadership has made EMPIRE Bolts, Nuts and Rivets the standards by which industrial fastenings are judged the world over.

BOLTS: Carriage • Machine • Lag • Plow • Stove • Elevator • Step • Tap • Wheel & Rim • Battery • U-Bolts • Tire • Automotive • Drilled • Faced • Special Heat Treated • Etc. **NUTS:** Cold Punched • Semi-Finished • Hot Pressed • Case Hardened • Slotted • Castle • Machine Screw • Marsden Lock • Low Sulphur • **RIVETS:** Standard • Tinners' • Coopers' • Culvert • Clevis and Hinge Pins • **SCREWS:** Cap • Machine • Hanger • Sheet Metal • Phillips Recessed Head • **WASHERS:** Plate • Burrs • **MATERIALS:** Steels • Alloys • Non-ferrous Metals • Brass • Bronze • Everdur • Herculoy and others • **RODS:** Stove • Seat • Ladder • **PLATED PARTS:** Cadmium • Zinc • Chromium • Nickel • Hot Galvanized • Copper • Tin • **SPECIAL UPSET & PUNCHED PRODUCTS**

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.
SALES OFFICES: CHICAGO • DETROIT • PHILADELPHIA
DENVER • SAN FRANCISCO • LOS ANGELES • SEATTLE • PORTLAND

ension to bridge 110.36,
railroad, Rochville, Pa.
bridge 379.32, FAGH-264-
N. Dak.

ge 212 and 74, Missouri
ad, Independence, Kans.,
Mo.

ension to sheet metal an-
ging, Otis Steel Co., Cleve-

ce barracks and garages,
Danielson, Conn., for state.
line and storage buildings,
Co., Chester, Pa.

ge highway bridge, Prince-

se highway bridge, Chilli-

per plant facilities, Kings
for state.

building, for W. C. Gates,

50-ton overhead traveling
eation 843, Grand Coulee
Bedford Foundry & Ma-
edford, Ind., low at \$12,700.
lage, lift span bridge, Hood
ron, for Washington Bridge
nt, Wash.; Gilpin Construc-
etland, Oreg., general con-

lage, shapes for Coulee pw-
ashington state; bids in at
ne 2.

trage, gantry and traveling
Roza diversion dam and
per plant; Schmitt Steel Co.,
and Bedford Foundry & Ma-
edford, Ind., low.

trage, Ohio Injector Co.,
O.

last week on the Luna park hous-
ing project, involving 750 tons. A
number of school jobs here have
kept local fabricators fairly busy
and additional work from this source
is expected soon. Private work is
light although some gains have
been noted recently. No improve-
ment in the price situation has de-
veloped.

Philadelphia — Turner Construc-
tion Co., Philadelphia, has been
awarded the contract for Delaware
hospital, Wilmington, Del., and will
take bids June 15 on the bars re-
quired, about 500 tons. Prices con-

tinue decidedly weak despite report-
ed efforts to stiffen the market.

Seattle — Bethlehem Steel Co.,
Seattle, booked 1600 tons involved
in the federal court house, Seattle,
N. P. Severin Co., Chicago, general
contractor. About 1000 tons are
pending in various projects in this
area, including several small in-
dustrial plant jobs.

San Francisco — Awards totaled
1507 tons, bringing the aggregate
for the year to 77,026 tons, compared
with 41,534 tons for the same period
last year. Gilmore Fabricators Inc.
took 219 tons for an industrial build-



Reinforcing

Reinforcing Bar Prices, Page 83

— The price situation
ed, although there is pos-
a firmer market in east-
will develop shortly. New
are fairly active with pros-
wards will be maintained
the next 60 days at
of the new work is
jobs, with the vari-
ions of the Pennsyl-
take between Pittsburgh
burg holding the spot-

— Volume of pending
has decreased, but nu-
ger projects are still
e. Award is expected
tons for a department
culture laboratory, Peoria,
bridges for the board of
movements, Chicago, in-
ns.

— Buying is heavier,
tons for an east side
on here. Inquiries are
in better volume, with
closing June 12 on close
for bridges and high-
ces continue weak with
ages bringing out sub-
cessions.

— Bids went in late

Emergency Service -

COLD drawn steel requirements
cannot always be anticipated.
Occasionally there are *rush* orders.
Warehouse stocks of regular cold
drawn steels in standard sizes and
shapes are carried in all important
manufacturing centers. Emergency
service—rush order service—is at
your elbow—The Telephone.

Moltrup Steel Products Co.

Beaver Falls, Pa.

(Pittsburgh District)

New York • Chicago • Philadelphia • Cleveland • Boston • Houston • Detroit
Erie • San Francisco • Atlanta • Norfolk • Seattle • Pittsburgh • Buffalo • Dayton

—The Market Week—

ing on Alcatraz Island and unnamed interests were awarded 200 tons for a mausoleum at Inglewood, Calif.. Barracks, mess hall and galley buildings for the naval air base, Alameda, Calif., up for bids on June 14, will require 1505 tons.

Reinforcing Steel Awards

1600 tons, East side drive, Fifty-fourth to Sixty-fourth street, New York, to Truscon Steel Co., Youngstown, O.; through Poirier & McLane Corp., New York.

1600 tons, Seattle federal courthouse, to Bethlehem Steel Co., Seattle; N. P. Sev-

erin, Chicago, general contractor.
700 tons, housing project, Newark, to Bethlehem Steel Co., Bethlehem, Pa.; through Fatzler Co., Newark.

700 tons, administration group buildings, Washington, to Bethlehem Steel Co., Bethlehem, Pa.; Chas. H. Tompkins, contractor.

500 tons, Great Lakes Carbon Corp. plant, Niagara Falls, N. Y., and 375 tons for Commodore housing project, Buffalo, listed under Reinforcing placed in May 29 issue as awarded to Bethlehem Steel Co. were erroneously reported.

375 tons, Kleinhans music hall, Buffalo, to Bethlehem Steel Co., Buffalo.

300 tons, Triborough hospital, Queens, N. Y., to Wickwire-Spencer Steel Co., New York; through Eureka Mfg. Co.,

New York.

275 tons, buildings, New York, to Truscon Steel Co., Brooklyn, N. Y.; to Truscon Steel Co., Youngstown, O.

219 tons, industrial building, San Francisco, to Truscon Steel Co., San Francisco.

200 tons, housing development, and G. Syracuse, N. Y., to Truscon Steel Co., Bethlehem, Pa.; Co., Syracuse, contractor.

200 tons, mausoleum, Inglewood, to unnamed interest.

191 tons, highway work, Grant, Jefferson county, Oregon, interests.

175 tons, bridge, route 77, Graysville, Illinois, to Bethlehem Steel Co., Bethlehem, Pa.

160 tons, bridge, Mazonia, Ill., to Bethlehem Steel Co., Chicago.

150 tons, addition to Bullock, Los Angeles, to unnamed interest.

125 tons, Cross Island park, Queens, N. Y., to Iggo Bros., New York; through J. Leopold & Co., New York.

125 tons, highway project, Warren county, New Jersey, to Truscon Steel Co., Newark, N. J.; through J. & Korp, Camden, N. J.

100 tons, Batelle Memorial hospital, Columbus, O., to West Virginia, Huntington, W. Va.; E. E. E. contractor.

100 tons, walnut packing plant, Santa Ana, Calif., to unnamed interest.

100 tons, five bridges, Arapahoe, Colorado, to unnamed interest.

Reinforcing Steel Permits

1505 tons, barracks, mess hall and buildings, specification 861, Alameda, Calif.; bids postponed to June 14.

1280 tons, highway project, Orange and Suffolk counties, New York; bids June 21.

850 tons, Great Salt Plains, Little Rock, Ark.

720 tons, viaduct, Brooklyn, N. Y., to Truscon Steel Co., Newark, N. J.; general contractor.

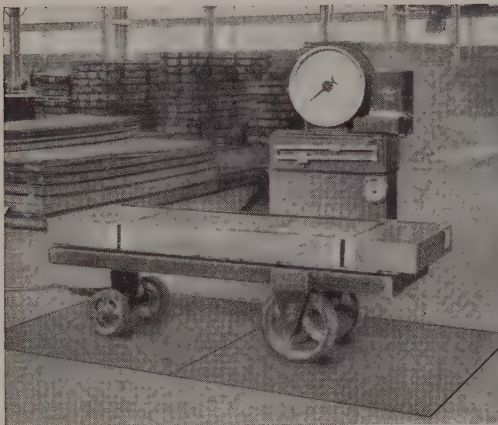
700 tons, viaduct, Shore Road, 39-9, Brooklyn, N. Y.

693 tons, Western Regional, Albany, Calif.; bids open.

600 tons, laboratory building, Department of Agriculture, New H. A. Rife Construction Co., Tex., low.

500 tons, Delaware hospital

A Matter of Record!



**Fairbanks Platform
Dial Scales
with Printomatics
PROTECT
PROFITS
IN STEEL**

Fairbanks platform dial scale with Printomatic used for weighing and printing weights in a steel plant.

In mills, factories, warehouses—wherever avoidable weighing inaccuracies and needless wasted time reduce legitimate margins—it's a matter of record that Fairbanks platform dial scales with Printomatics protect profits in steel. For incoming or outgoing shipments—or for production lines or interdepartment checking—the scale is loaded . . . a button is touched . . . and actual weight figures are a matter of record.

Inadequate light, poor eyesight, guesswork need no longer take their toll of profits, for the Printomatic never makes mistakes. Accurate weights are printed on tickets or roll tape in single, duplicate, or triplicate

form. Hurried weighmen no longer squint and hope their eyes are not deceiving . . . for the moment the pointer comes to unwavering rest, the Printomatic is ready to tell the truth in print.

The traditional accuracy of Fairbanks scales is your assurance that small margins will not fall prey to human errors. Find out how Fairbanks scales can make added savings and increased profits a matter of record in your plant.

Write Fairbanks, Morse & Co., Dept. 96, 600 South Michigan Avenue, Chicago, Illinois. Branches and service stations throughout the United States and Canada.

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FAIRBANKS MORSE

DIESEL ENGINES
PUMPS
ELECTRICAL MACHINERY
FAIRBANKS SCALES
RAILROAD EQUIPMENT

WATER SYSTEMS
WASHERS-IRONERS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS



Scales

Concrete Bars Com

Week ended June 3 . . .
Week ended May 27 . . .
Week ended May 20 . . .
This week, 1938
Weekly average, year . . .
Weekly average, 1939 . . .
Weekly average, April . . .
Total to date, 1938
Total to date, 1939

*Revised

Includes awards of 100

—The Market Week—

spiegeleisen are not expected to be opened much before the middle of June, but no revisions in prices are looked for. Ferromanganese shipments have tapered so far this month and the May total is thought likely to fall below April. Spiegeleisen movement is steady.

the Whitsuntide period but steel and ironworks continued practically full operation. Normal commercial demand is expanding and foundry pig iron shipments are improving. Two stacks have been relighted by Colvilles Ltd. and United Steel Co. Quota of semifinished Continental steel imports has been increased 300,000 tons for the May to October period.

The Continent reports quiet Whitsuntide trade. Underlying market conditions are good. Home and export production is increasing and prices are firm.

Steel in Europe

Foreign Steel Prices, Page 85

London—(By Radio)—Markets of Great Britain have been quiet during



Perkins Man Coolers create refreshing recirculation of air without chilling drafts.

Perkins Man Coolers help to maintain production schedules in the hottest places.

Perkins Man Coolers decrease labor turnover and help to make contented workers.

PERKINS MAN COOLERS ARE MADE IN OSCILLATING AND STATIONARY TYPES, BOTH PORTABLE.

B. F. PERKINS & SON, INC. HOLYOKE, MASS.

Engineers and Manufacturers

PERKINS MAN COOLERS

TRADE MARK REG. U.S. PAT. OFF.

Behind the Scenes with STEEL

Wintersteen for President

■ We meant to tell you before about the 63rd annual bull fight, ox roast and Wintersteen birthday party held over in Lebanon, Pa., week before last. Railroad men and suppliers from all over the country gathered for this old-fashioned outdoor picnic in honor of John Wintersteen, president of the Cornwall & Lebanon railroad, the 13-mile road (now owned by Bethlehem) which carries ore from the historic Cornwall banks. We are told ore from these famous banks went into cannon used during the Civil war. With live bulls for playmates, we understand, P. J. Cristy, eastern sales manager, Chicago Pneumatic Tool Co., had quite a time as master of ceremonies.

Copy Chasers Note

■ Never, say the experts, should one use superlatives in one's advertising. The Smithville (Ohio) Inn Inc. thinks differently. Their timid copy reads: *The largest, most famous and best chicken dinner house in America!* And it is.

Utopia Defined

■ At the opening of the World Automotive Engineering Congress in New York a couple of weeks ago Alfred Reeves, general manager, Automobile Manufacturers' association, whimsically referred to the remoteness of Utopia. Utopia, he said, will never come until the Ku Klux Klan meets the Knights of Columbus at baseball on a Zion City diamond on a Sunday, with Father Divine as umpire and with the proceeds to go to the Jewish refugees abroad.

Dentist Goes Awelding

■ From the Welding Engineering Co. up Milwaukee-way comes a copy of a letter they recently received from a dentist out in Kansas. "Your quotation interests me. I fear you will be dis-

couraged or displeased with my seeming vacillation and hesitancy, but I believe I should first get the sanction of the power company. Up to the present my knowledge of welding is limited, though I have read the few treatises I can get hold of. But these simply spur me and intensify my cognizance of the meagerness of my knowledge of the principles and fundamentals of processes by which electricity accomplishes its purposes. Now, with the above, please tell me more details of your A. C. welder." Roll over, Mr. Webster, you have sold another dictionary.

Elephantiasis

■ G. J. Hawkey, Cleveland Duplex Machinery Co., gives us another mild ribbing on our elephant friend who graces the Materials Handling page each week. Says he: *His eyes look like mine felt last night after a strenuous session of the A. S. T. E. at the German club. Furthermore, how did this elephant get the bad case of "housemaid's knee" on his right front leg?* So far as we can tell, Mr. Hawkey, the ol' boy apparently used to do a specialty act with Ringling Brothers before we got him. The climax of the show was when he spun around 37 times on that right front knee, with the mahout on top spinning the opposite way while the band played the Toreador from Carmen.

'Way Back When

■ STEEL, it would seem, has a lasting quality much like a rare perfume. Last week from Pittsburgh came an urgent request for a copy of the May 25, 1911 issue, which incidentally we don't recall very clearly since we were only three days into this strange and baffling world and did not yet know where to get authoritative information on the steel and metalworking industry.

SHRDLU

—The Market Week

Pig Iron

Pig Iron Prices, Pa.

Pittsburgh—Shipments increased slightly. Foundries are better in some but gains are irregular. Still is being shipped at ailing before the \$1 a year.

Cleveland—Pig iron accepting business for winter delivery, at current have made no formal commitment to this effect. Interward contracting is slow. Consumers still having against old commitment.

Chicago May shipments about 3 to 5 per cent higher in line with early expectations, however, report substantial increase because shipments.

Boston—The Everett process goes in blast this iron buying has improved but with little gain in foundries.

Cincinnati—Northern pig iron have been reaffirmed for winter and southern iron also are expected to be better.

Philadelphia—May pig iron shipments were about 30 per cent of April. Consumption well. It is generally assumed will be continued into the without formal announcement.

Buffalo—May pig iron were slightly ahead of foundries ordering tonnage immediate needs. Light additional blast furnace hem Steel Co. gives seven active stacks out.

Warehouse

Warehouse Prices, Pa.

Philadelphia — Ware continuing sheet price levels, explaining that spread over mill figures justifiably narrow. May was about 10 per cent April, 20 per cent better ago.

Cleveland — Sales little effect from recent conditions, May business about that of April. June orders definite, but only small in demand are expected.

St. Louis — Sales taper of May, wiping out gains April earlier in the month for June and July is so favorable. Demand from is slow.

Boston — Improvement house volume which discouraged last month.

Nonferrous Metals

Nonferrous Metal Prices, Page 100

New York — No definite trend was discernible in London metal markets last week with both sales and prices fluctuating in line with favorable and unfavorable developments.

Copper — While electrolytic held unchanged here at 10.00c, Connecticut, the export market advanced to around 10.17½c, c.i.f. European ports which forced refiners to raise their bids for copper and brass scrap

½-cent. The sales volume here, while under 20,000 tons, was the third heaviest for any month so far this year.

Lead — Active demand here and rising prices abroad strengthened the undertone of the domestic market. Actual consumption has shown gradual improvement recently. All first hands again quoted on the basis of 4.60c, East St. Louis.

Zinc — Consumer buying interest tapered, reflecting in part the further decline in galvanized sheet output rate to 54 per cent. Prime western held at 4.50c, East St. Louis.



Protect Your Workers with MORTON'S SALT TABLETS

Heat-Fag and hot weather travel together. You can't stop the weather — but, you can protect your workers against Heat-Fag and stop the sag in the production line by placing Morton's Salt Tablets at every drinking fountain. These handy little tablets represent the easiest and most convenient way to replace the vitally needed body salt that's sweated out by hard work on hot days.

MORTON'S SALT TABLETS

Dissolve in 50 Seconds

Workers find them easy to take with a drink of water. They dissolve quickly. Only the purest and most highly refined salt is used.

MORTON'S DISPENSER . . . Sanitary, Economical, Convenient

Install Morton's dispensers and salt tablets in your plant now. Get ready for the hot days ahead. Remember—a small investment now will protect the health and efficiency of your workers when Heat-Fag threatens your plant. Shipments will be made promptly — prepaid.

Write for folder—"Heat-Fag"



MORTON SALT COMPANY CHICAGO, ILLINOIS

ne. While orders are all, purchases are more and well diversified. New standard items are

op

Prices, Page 86

—Mill buying is quiet, reflects improvement in buying. Prices are un- buyers offering fig- the quoted range. Ex- down within the next of plant recently produc- the scrap, coupled with ingot rate, give a bet- summer months.

—Scrap activity is at a low of automotive scrap last week brought un- prices. Cast grades are in but also are relatively

—Better demand for low-price scrap grades is relatively high prices have developed on the usual grades as a result of

—ore grades of scrap are to current export ship- stove plate and No. former bringing \$10.50, and No. 2 cast around \$12. Domestic scrap buy- movement against old continues brisk. Prices be unchanged and un-

— With new railroad iron and steel scrap of tions, some ear-marked in the scrap market has material, although inactivity of the past

— No. 1 heavy melting ally is bringing dealers hough last significant mill here at \$13. Rumors of are without confirma-

ore

Prices, Page 86

— May shipments of iron ore totaled 3, an increase of 2,420, 205 per cent over the shipped a year ago, the Lake Superior Iron ion. Shipments to June d 3,658,251 tons, an in- 34 per cent over the 1, shipped in the same 38.

USE MOORE RAPID *Lectromelt* FURNACES for MELTING REFINING SMELTING

Alloy and Carbon Steels.
Gray and Malleable Irons.
Copper, Nickel and Alloys.
Ferro-Alloys, Carbide.
Special Products.

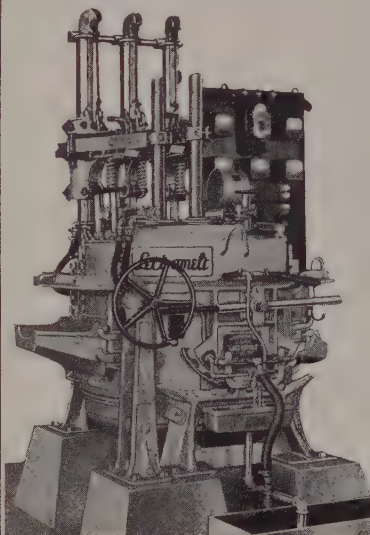


Illustration shows a 500 pound capacity 3 phase direct arc LECTROMELT furnace installed in jobbing steel foundry.

**RAPID
ECONOMICAL
RUGGED**

BUILT IN STANDARD SIZES
25 LBS. TO 50 TONS CAPACITY

**PITTSBURGH
LECTROMELT
FURNACE
CORP.**

PITTSBURGH, PA.

Nonferrous Metal Prices

Spot unless otherwise specified. Cents per pound.									
	Copper			Straits Tin, New York		Lead	Lead East	Zinc	Aluminum 99%
	Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	Spot	Futures	N. Y.	St. L.	St. L.	
May									
27	10.00	10.00	9.62½	49.00	48.62½	4.75	4.60	4.50	20.00
29	10.00	10.00	9.62½	49.00	48.75	4.75	4.60	4.50	20.00
30—Holiday									
31	10.00	10.00	9.62½	49.00	48.75	4.75	4.60	4.50	20.00
June									
1	10.00	10.00	9.62½	49.00	48.62½	4.75	4.60	4.50	20.00
2	10.00	10.00	9.62½	49.00	48.62½	4.75	4.60	4.50	20.00

MILL PRODUCTS

F.o.b. mill base, cents per lb., except as specified. Copper brass products based on 10.00c Conn. copper

Sheets	
Yellow brass (high)	16.48
Copper, hot-rolled	18.12
Lead, cut to jobbers	8.00
Zinc, 100 lb. base	9.75

Tubes	
High yellow brass	19.23
Seamless copper	18.62

Rods	
High yellow brass	11.85
Copper, hot rolled	14.62

Anodes	
Copper, untrimmed	15.37

Wire	
Yellow brass (high)	16.73

OLD METALS

Nom. Del. Buying Prices

No. 1 Composition Red Brass

New York	5.87½-6.12½
Cleveland	6.50-6.75
Chicago	6.00-6.25
St. Louis	6.00-6.25

Heavy Copper and Wire

New York, No. 1	7.87½-8.00
Cleveland, No. 1	7.50-7.75

Chicago, No. 1	
St. Louis	

Composition Brass

New York	Light Copper
New York	
Cleveland	
Chicago	
St. Louis	

Light Brass

Cleveland	
Chicago	
St. Louis	

Lead

New York	
Cleveland	
Chicago	
St. Louis	

Zinc

New York	
Cleveland	
St. Louis	

Aluminum

Borings, Cleveland	
Mixed, cast, Cleveland	
Clips, soft, Cleveland	
Misc. cast, St. Louis	

SECONDARY METALS

Brass ingot, 85-5-5-5, less standard No. 12 aluminum

Construction and Enterprise

New York

HUDSON FALLS, N. Y.—Union Bag & Paper Corp. has plans underway for erecting and equipping a two-story, 100 x 100-foot addition to its plant.

NEW YORK—General Tire Co. of New York has plans in progress for altering its four-story warehouse and shipping plant at cost of \$100,000. Francisco & Jacobus, New York, architects.

NIAGARA FALLS, N. Y.—Great Lakes Carbon Corp., Chicago, has awarded contract to Walter S. Johnson Building Co., Niagara Falls, for a carbon electrode plant estimated to cost more than \$40,000.

Connecticut

NEW BRITAIN, CONN.—City, G. J. Coyle, mayor, is making a survey in connection with proposed construction of a municipal power plant costing more than \$40,000. L. T. Klander, Philadelphia, consulting engineer.

New Jersey

ENGLEWOOD, N. J.—Watson Elevator Co., New York, has awarded contract to Bonanno Construction Co., North Bergen, N. Y., for a two-story, 100 x 250-foot addition to its elevator factory.

Pennsylvania

BLOSSBURG, PA.—J. P. Ward Foundry Co. has awarded a contract for rebuilding its foundry at estimated cost of \$100,000 to G. Case, Troy, Pa. (Noted May 22.)

JERSEY SHORE, PA.—Standard Cable

Corp., C. H. Mencer, repr. awarding contracts for altering silk mill for manufacture of other copper products. Cost at more than \$75,000 with

Ohio

DELPHOS, O.—Village. De mayor, is considering proposed electric system. Citizens' committee, representative in city

McGUFFEY, O.—Village. ling, clerk, will hold a special proposal to issue \$14,000 finance waterworks system. Van Wert, O., consulting engineer

STUEBENVILLE, O.—City. Boyd, service director, has plans and will probably begin work of June 12 on sewer and 10 for sewers and purification. Consulting engineers, H. P. Toledo, O. (Noted May 1.)

TROY, O.—Village. Will assistant service director, at noon, June 14, on adding generating equipment and underground distribution system. Consulting engineers, Froehlich Toledo, O.

Michigan

ANN ARBOR, MICH.—City. Corp. proposes to construct 60 x 120-foot addition to its cost of more than \$160,000.

PONTIAC, MICH.—Amet & Socket Co. plans to construct of \$100,000 a 120 x 340-foot addition to its plant for

—Construction and Enterprise—

Ware. Will install manufacturing power equipment. C. J. Smith, architect.

SPRINGFIELD, ILL.—Illinois Rural Electric Co. G. Bryan, project superintendent, has been allotted a \$100,000 additional rural electric transmission lines in eight counties. J. W. Goodwin Engineering Co., Clayton, Mo., engineers.

SPRINGFIELD, ALA.—City asks \$10,000 on water distributing system valves, hydrants, etc., estimated cost, \$23,000. J. W. Goodwin Engineering Co., Birmingham, Ala., contractor.

SPRINGFIELD, ALA.—Court of Commissioners receives bids June 3 for a waterworks system, including distributing system, electric tank and iron removal. Estimated cost, \$23,000. J. W. Goodwin Engineering Co., Birmingham, Ala., engineer.

Columbia

SPRINGFIELD, ALA.—Navy department, building and docks, plans to build base costing \$50,000 at the new base in San Diego.

SPRINGFIELD, FLA.—West Florida Cooperative Electric Co. E. M. Wade, superintendent, has been allotted a \$100,000 REA allotment and will construct 290 miles of rural electric power lines in four counties.

SPRINGFIELD, MISS.—Singing River Electric Association, Ben Deshaze, superintendent, has been allotted \$213,000 by REA to erect 290 miles rural power lines in four counties.

SPRINGFIELD, MISS.—City votes June 6 to issue \$200,000 bonds to make improvements to its waterworks, including a reservoir.

Alina

SPRINGFIELD, N. C.—Brunswick Membership Corp. has received an REA allotment of \$171,000 for 211 miles of rural electric power lines in two counties.

SPRINGFIELD, TENN.—Upper Cumberland Membership Corp. has been allotted \$100,000 by REA for 381 miles of transmission lines in four counties.

SPRINGFIELD, TENN.—Maigs County Membership Corp. has been allotted \$100,000 REA loan to finance 290 miles of rural electric power transmission lines in six counties.

SPRINGFIELD, TENN.—Middle Tennessee Membership Corp. has received \$100,000 allocation from REA for 590 miles of rural electric lines in four counties.

SPRINGFIELD, TENN.—Duck River Membership Corp. has a \$100,000 allotment for 590 miles of lines serving 4488 consumers in four counties.

SPRINGFIELD, LA.—Wackman Welded

Wire Co., St. Louis, has plans for a plant for manufacturing fabricated steel products. Cost estimated at \$100,000.

Virginia

BLACKSTONE, VA.—Southside Electric Co-operative, C. S. Hooper Jr., superintendent, will build approximately 401 miles of rural power lines in ten counties at cost of more than \$1,000,000.

Missouri

SPRINGFIELD, MO.—City receives bids June 6 for constructing a filter at north-west sewage disposal plant. Funds avail-

able include \$180,135 PWA allotment and \$220,000 city bonds.

Oklahoma

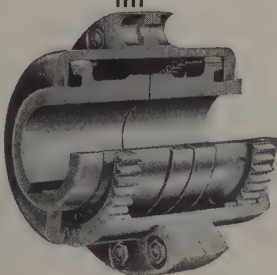
SAYRE, OKLA.—Northfork Electric Co-operative Inc., E. M. Wade, president, is receiving bids for 156 miles of rural electric lines in Beckham county and 275 miles in Rogers Mills county. Total cost estimated at \$145,000.

Texas

HOUSTON, TEX.—Hake Tool Co. is erecting a one-story factory building which will be leased after completion.

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SAN AUGUSTINE, TEX.—Deep East Texas Electric co-operative soon takes bids on 181 miles of rural power lines in seven counties at cost of \$157,000. W. G. Morrison, Waco, Tex., engineer.

Kansas

BELLEVILLE, KANS.—REA has allotted \$313,000 to the N.C.K.R.E. association, Guy Ward, representative, to finance 355 miles rural electric lines in two counties. Paulette & Wilson, Salina, Kans., consultants.

EL DORADO, KANS.—Butler Rural

Electric co-operative, A. H. Gish, president, has been allotted \$132,000 by REA for 138 miles of rural power lines serving 312 consumers in two counties.

PLEVNA, KANS.—Arkansas Valley Electric co-operative, George Griffin, president, has received \$251,000 from REA to finance some 300 miles of rural transmission lines in three counties.

SENECA, KANS.—REA has allotted \$350,000 to Marshall-Nemeha Rural Electric service, A. J. Wempe, president, to finance 375 miles rural electric power transmitting lines in two counties. Paulette & Wilson, Salina, Kans., consultants.

North Dakota

KINDRED, N. DAK.—Cass County Electric co-operative, E. J. Morton, secretary, has been allotted an additional \$183,000 by REA to finance 212 miles of rural power transmission lines in four counties. M. S. Hyland, Fargo, N. Dak., consulting engineer.

Iowa

EDGEWOOD, IOWA—City, L. L. Shaffer, clerk, is considering construction of a municipal power and light plant to cost more than \$15,000 with equipment.

NEW HAMPTON, IOWA—City, Alva Griffith, clerk, is studying proposal to construct a municipal power plant costing \$200,000. Project involves 750-kilowatt diesel engine with appurtenances, cooling tower, fuel oil tanks, switchboard panel. Ralph D. Thomas & Associates, Minneapolis, consulting engineers.

PRESTON, IOWA—City has voted to build a municipal power and light plant at cost not to exceed \$45,000. (Noted May 15.)

SIBLEY, IOWA—REA has allotted \$181,000 loan to Osceola Electric co-operative, Henry Consoer, president, to finance rural transmission lines in the county totaling 197 miles.

WATERLOO, IOWA—City, Ralph Slipper, mayor, has completed plans and will soon accept bids for two sewage disposal plants estimated to cost together about \$750,000. C. T. Wilson, city engineer.

Idaho

ASHTON, IDAHO—Fall River Rural Electric co-operative takes bids to 10 a.m., June 8, on 73 miles of rural power lines. Walter Flora, Cheyenne, Wyo., consulting engineer. Certified check 5 per cent to accompany bid.

Pacific Coast

BERKELEY, CALIF.—A. Lietz Mfg Co., maker of engineering, drafting and marine instruments, plans to start construction immediately of a new plant. First unit to comprise 10,000 square feet. A. Leitz Jr., president, San Francisco.

LOS ANGELES—Clarkiron Co., E. Reynolds, president, is drawing preliminary plans for a projected iron ore extraction plant costing \$750,000. W. Gordon Clark, Los Angeles, engineer.

PASADENA, CALIF.—City proposes to install at cost of about \$25,000 a new blower to operate aeration tanks at its sewage disposal plant. H. W. Hincks, city engineer.

SAN BERNARDINO, CALIF.—Arrowhead Springs Hotel Co. will take bids this month on a sewage disposal plant, with Imhoff tank, trickling filter, sec-

ondary tank and sand filter. Estimated cost \$25,000. Currie Engineering, Bernardino, engineer.


PORTLAND, OREG.—Truitt Construction Co. has been awarded a contract to erect at cost of \$30,000, shop buildings at Boise, Idaho. United States forestry service.

Canada

SUMMERLAND, B. C.—City takes bids until Aug. 1 on a new system costing \$145,000. J. D. Summerland, consultant.

OTTAWA, ONT.—Department of Public Works has drawn up plans for a \$100,000 power house, and machine shop at Lorne.

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Washburn Wire Co.,
Phillipsdale, R. I.
Wisconsin Steel Co.,
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Andrews Steel Co., The,
Newport, Ky.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Heppenstall Co., 47th & Hatfield
Sts., Pittsburgh, Pa.
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Jones & Laughlin Bldg.,
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Midvale Co., The,
Nictown, Philadelphia, Pa.
Republic Steel Corp.,
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Standard Steel Works Co.,
Paschall P. O., Philadelphia, Pa.
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Birmingham, Ala.
Timken Steel & Tube Co.,
Canton, O.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.

BILLETS AND BLOOMS

(*Also Stainless)
*Alan Wood Steel Co.,
Conshohocken, Pa.
*Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Andrews Steel Co., The,
Newport, Ky.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
*Firth-Sterling Steel Co.,
McKeesport, Pa.
Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Pittsburgh Steel Co.,
Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp.,
Dept. ST, Cleveland, O.
Standard Steel Works Co.,
Paschall P. O., Philadelphia, Pa.
Stanley Works, The,
New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Timken Steel & Tube Co.,
Canton, O.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.
Youngtown Sheet & Tube Co.,
Youngstown, O.

BINS (Storage)

Petroleum Iron Works Co.,
Sharon, Pa.

BLAST FURNACE CLEANING

(Gas)
Peabody Engineering Corp.,
580 Fifth Ave., New York City.
Research Corp., 405 Lexington
Ave., New York City.
Western Precipitation Corp.,
1016 W. 9th St., Los Angeles,
Calif.

BLAST FURNACE SPECIALTIES

Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co.,
310 S. Michigan Ave.,
Chicago, Ill.
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.
Leeds & Northrup Co., 4901 Sten-
ton Ave., Philadelphia, Pa.

BLAST FURNACES—See FURNACES (Blast)

BLOCKS (Chain)

Ford Chain Block Co., York, Pa.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

BLOWPIPES (Hand and Stand)

American Gas Furnace Co.,
Elizabeth, N. J.

BLOWERS

American Gas Furnace Co.,
Elizabeth, N. J.
General Electric Co.,
Schenectady, N. Y.
Ingersoll-Rand Co.,
11 Broadway, New York City.
Sawyer Electrical Mfg. Co.,
5715 Levene St., Los Angeles, Cal.
Stewart Furnace Div., Chicago
Flexible Shaft Co., 1106 So.
Central Ave., Chicago, Ill.
Sturtevant, B. F., Co., Hyde Park,
Boston, Mass.

BLOWPIPES (Air—Gas)

American Gas Furnace Co.,
Elizabeth, N. J.

BLOWPIPES (Oxy-Acetylene)

Linde Air Products Co., The,
30 E. 42nd St., New York City.

BOILER HEADS

Bethlehem Steel Co.,
Bethlehem, Pa.

BOILER TUBES—See TUBES (Boiler)

BOILERS

Babcock & Wilcox Co., The,
19 Rector St., New York City.
Oil Well Supply Co., Dallas, Texas.

BOLT AND NUT MACHINERY

Landis Machine Co., Inc.,
Waynesboro, Pa.

BOLTS

(*Also Stainless)
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Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Ohio Nut & Bolt Co., The,
600 Front St., Berea, O.
*Republic Steel Corp., Upon Nut
Div., Dept. ST, 1912 Scranton
Rd., Cleveland, O.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.
*Ryerson, Jos. T., & Son, Inc.,
16th and Rockwell Sts.,
Chicago, Ill.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.

BOLTS (Carriage and Machine)

Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Republic Steel Corp., Upon Nut
Div., Dept. ST, 1912 Scranton
Rd., Cleveland, O.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Chicago, Ill.

BOLTS (Special)

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Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Republic Steel Corp., Upon Nut
Div., Dept. ST, 1912 Scranton
Rd., Cleveland, O.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.

BOLTS (Stove)

Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Republic Steel Corp., Upon Nut
Div., Dept. ST, 1912 Scranton
Rd., Cleveland, O.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.
Ryerson, Jos. T., & Son, Inc.,
16th and Rockwell Sts.,
Chicago, Ill.

BOLTS (Stove, Recessed Head)

American Screw Co.,
Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co.,
New Bedford, Mass.
Corbin Screw Corp.,
New Britain, Conn.
Lamson & Sessions Co., The,
Cleveland, O.
National Screw & Mfg. Co.,
Cleveland, O.
Pheoli Mfg. Co., Chicago, Ill.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

BOLTS (Track)—See TRACK BOLTS

BORING MACHINES (Precision)

Heald Machine Co.,
Worcester, Mass.

BOXES (Annealing)

Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
National-Erie Corp., Erie, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
Union Steel Casting Co., 62nd &
Butler Sts., Pittsburgh, Pa.
United Engineering & Foundry Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Wilson, Lee, Engineering Co.,
1370 Blount St., Cleveland, O.

BOXES (Open Heart)
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Continental Roll &
E. Chicago, Ind.
Morgan Engineering
Alliance, O.
Petroleum Iron Work
Sharon, Pa.

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Clark Controller Co.,
1146 E. 152nd St.,
Electric Controller Co.,
2698 E. 79th St.,

BRAKES (Hydraulic)

Wagner Electric Co.,
4904 Baum Blvd.,

BRAKES (Press)

Cincinnati Shaper Co.,
Garrard Sts., Cin.

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Norton Co., Worcester.

BRIDGE CRANES

(Handling)—See CRANES

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Belmont Iron Works,
22nd St., and Wa.
Philadelphia, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Blaw-Knox Co., Bla.
Columbia Steel Co.,
San Francisco, Cal.
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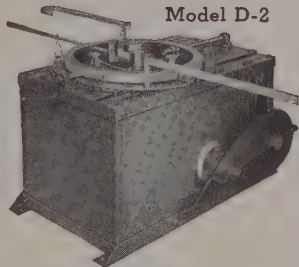
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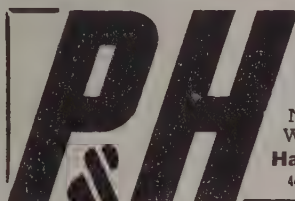
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 Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
 Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
 Surface Combustion Corp., 2375 Dorr St., Toledo, O.
 Wean Engineering Co., Warren, O.
 Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

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Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
 Shenango-Penn Mold Co., Dover, O.

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Rhoades, R. W., Metaline Co., 50 3rd St., Long Island City, N. Y.

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 Wilputte Coke Oven Corp., 570 Lexington Ave., New York City.

CAISSONS (Pneumatic)

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CALCIUM METAL AND ALLOYS

Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CAP SCREWS—See SCREWS (Cap, Set, Safety-Set)**CAR DUMPERS**

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 Industrial Brownhoist Corp., Bay City, Mich.
 Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CAR PULLERS AND SPOTTERS

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 Cullen-Friedstedt Co., 1308 Kilbourn Ave., Chicago, Ill.
 Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

CARBIDE

Linde Air Products Co., The, 30 E. 42nd St., New York City.
 National Carbide Corp., 60 E. 42nd St., New York City.
 National Cylinder Gas Co., 205 W. Wacker Dr., Chicago, Ill.
 Shawinigan Products Corp., Empire State Bldg., New York City.

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Houghton, E. F. & Co., 240 W. Somerset St., Philadelphia, Pa.

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Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
 Morgan Engineering Co., The, Alliance, O.

CARS (Industrial and Mining)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Petroleum Iron Works Co., Sharon, Pa.

CARS (Scale)

Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTINGS (Acid Resisting)

Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
 Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
 Farrell-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
 344 Vulcan St., Buffalo, N. Y.
 International Nickel Co., Inc., The, 67 Wall St., New York City.
 Meehanite Metal Corp., Pittsburgh, Pa.
 National Alloy Steel Co., Blawnox, Pa.
 National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
 Shenango-Penn Mold Co., Dover, O.

CASTINGS (Alloy Steel)

Babcock & Wilcox Co., The, 19 Rector St., New York City.
 Bethlehem Steel Co., Bethlehem, Pa.
 Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
 Damascus Steel Casting Co., New Brighton, Pa.
 Ohio Steel Fdry. Co., Lima, O.
 Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
 Ryerson, Jos. T. & Son, Inc., 16th and Rockwell St., Chicago, Ill.
 Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
 United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
 Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Brass, Bronze, Copper, Aluminum)

Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
 Bethlehem Steel Co., Bethlehem, Pa.
 Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.
 Morgan Engineering Co., The, Alliance, O.
 National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
 Shenango-Penn Mold Co., Dover, O.
 Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS (Brass, Pressure)

Titan Metal Mfg. Co., Bellefonte, Pa.

CASTINGS (Die)—See DIE CASTINGS**CASTINGS (Electric Steel)**

Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Damascus Steel Casting Co., New Brighton, Pa.
 Farrell-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
 344 Vulcan St., Buffalo, N. Y.
 National-Erie Corp., Erie, Pa.
 West Steel Casting Co., 805 E. 70th St., Cleveland, O.
 Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

CASTINGS (Gray Iron, Alloy, or Semi-Steel)

American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
 Bartlett-Hayward Div., The Koppers Co., Baltimore, Md.
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
 Columbia Steel Co., San Francisco, Calif.
 Erie Foundry Co., Erie, Pa.
 Farrell-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
 344 Vulcan St., Buffalo, N. Y.
 Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
 Hyde Park Foundry & Machine Co., Hyde Park, Pa.
 Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
 Midvale Co., The, Nicetown, Philadelphia, Pa.
 National Roll & Foundry Co., The, Avonmore, Pa.
 Oil Well Supply Co., Dallas, Texas.
 Shenango Penn Mold Co., Dover, O.
 Western Gas Div., The Koppers Co., Fort Wayne, Ind.

CASTINGS (Heat Resisting)

Farrell-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
 344 Vulcan St., Buffalo, N. Y.
 National Alloy Steel Co., Blawnox, Pa.
 Shenango Penn Mold Co., Dover, O.

CASTINGS (Malleable)

Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
 Erie Malleable Iron Co., W. 12th & Cherry Sts., Erie, Pa.
 Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
 Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
 Peoria Malleable Castings Co., Peoria, Ill.

CASTINGS (Manganese Steel)

Damascus Steel Casting Co., New Brighton, Pa.

CASTINGS (Steel)**(*Also Stainless)**

Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
 Bethlehem Steel Co., Bethlehem, Pa.
 Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
 Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
 Columbia Steel Co., San Francisco, Calif.
 Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
 Damascus Steel Casting Co., New Brighton, Pa.
 Farrell-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
 344 Vulcan St., Buffalo, N. Y.
 Koppers Co., Western Gas Div., Fort Wayne, Ind.
 Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
 Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
 *Midvale Co., The, Nicetown, Philadelphia, Pa.
 National-Erie Corp., Erie, Pa.
 National Roll & Foundry Co., The, Avonmore, Pa.
 Ohio Steel Fdry. Co., Lima, O.
 Oil Well Supply Co., Dallas, Texas.
 Pittsburgh Rolls Corp., 41st and Willow Sts., Pittsburgh, Pa.
 Standard Steel Works Co., Paschal P. O., Philadelphia, Pa.
 Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O.
 Strong Steel Fdy. Co., Hertel & Norris Ave., Buffalo, N. Y.
 Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
 Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
 United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
 West Steel Casting Co., 805 E. 70th St., Cleveland, O.

CASTINGS (Wear Resisting)

Meehanite Metal Corp., Pittsburgh, Pa.
 Shenango Penn Mold Co., Dover, O.

CASTINGS (Worm and Gear Bronze)

Cadman, A. W., Mfg. Co., 28th and Smallman Sts., Pittsburgh, Pa.

CEMENT (Acid Proof)

Pennsylvania Salt Mfg. Co., 1000 Widener Bldg., Philadelphia, Pa.

CEMENT (High Temperature)

Carborundum Co., The, Perth Amboy, N. J.
 Norton Company, Worcester, Mass.

CEMENT (Refractory, High Temperature)

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CENTRAL STATION EQUIPMENT

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Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
 Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CHAIN (Malleable)

Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
 Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
 Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CHAIN (Roller)

Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
 Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.

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Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
 Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
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Brosius, Edgar E., Jr., Sharpsburg, Pa.

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Loftus Engineering Co., 509 Oliver Bldg., Pittsburgh, Pa.

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CHROME ORE

Samuel, Frank, & Co., Harrison Bldg., Philadelphia, Pa.

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Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

CHUCKS (Automatic)

Tomkins-Johnson Co., Mechanics St., Jacksonville, Fla.

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 Pennsylvania Salt Mfg. Co., Widener Bldg., Philadelphia, Pa.

CLUTCHES (Friction)

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 Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

CLUTCHES (Friction, Single Revolution)

Hilliard Corp., The, 100 W. 4th St., Chicago, Ill.

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Alan Wood Steel Co., Conshohocken, Pa.
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 Cleveland-Cliffs Iron Co., Commerce Bldg., Cleveland, Ohio.
 Columbia Steel Co., San Francisco, Calif.
 Koppers Co., The, Chicago, Ill.
 Hanna Furnace Corp., Ecorse, Detroit, Mich.
 Koppers Coal Co., Koppers Bldg., Pittsburgh, Pa.
 New England Coal & Iron Co., Boston, Mass.
 Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
 Snyder, W. P. & Co., Oliver Bldg., Pittsburgh, Pa.
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Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd.,
Chicago, Ill.

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Mathews Conveyor Co., 142 Tenth
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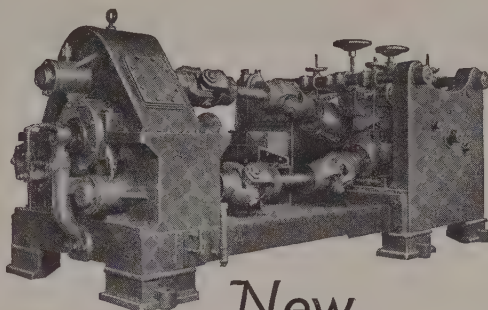
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Dravo Corp. (Engin'r'g Works Div.),
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INDUSTRIAL BROWNHOIST CORP.

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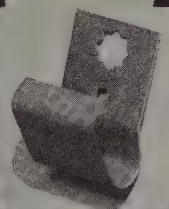
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Landis Machine Co., Inc., Waynesboro, Pa.

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Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.

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DRILLS (Twist)—See TWIST DRILLS

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Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 2501 Liberty St., Pittsburgh, Pa.

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Horsburgh & Scott Co., The, 114 Hammond Ave., Cleveland, O.
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Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
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DRIVES (Reciprocating)
Ajax Flexible Coupling Co., Westfield, N. Y.

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ECONOMIZERS
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ELECTRIC WIRING—See WIRE AND CABLE

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Thomas Machine Mfg., Pittsburgh, Pa.

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Carnegie-Illinois Steel Corp.,
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Brassert, H. A., & Co.,
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Pennsylvania Industrial Engineers,
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Co., Kalamazoo, Mich.
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Western Gas Div., The Koppers
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Koppers Co., Engineering and Con-
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Research Corp., 405 Lexington
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Footo Bros. Gear & Machine Corp.,
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King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Standard Steel Works Co.,
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344 Vulcan St., Buffalo, N. Y.
Footo Bros. Gear & Machine Corp.,
5301 S. Western Ave., Chicago, Ill.
Horsburgh & Scott Co., The, 5114
Hamilton Ave., Cleveland, O.
Jones, W. A., Fry & Mach. Co.,
4401 W. Roosevelt Rd.,
Chicago, Ill.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The,
2501 Liberty St., Pittsburgh, Pa.

GEARS (Steel Laminated)

Waldron, John, Corp.,
New Brunswick, N. J.

GEARS (Worm)

Cleveland Worm & Gear Co.,
3249 E. 80th St., Cleveland, O.
Footo Bros. Gear & Machine Corp.,
5301 S. Western Ave., Chicago, Ill.
Horsburgh & Scott Co., The,
5114 Hamilton Ave., Cleveland, O.
Simonds Gear & Mfg. Co., The,
2501 Liberty St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING

Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Footo Bros. Gear & Machine Corp.,
5301 S. Western Ave., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Grant Gear Works,
2nd and B Sts., Boston, Mass.
Horsburgh & Scott Co., The,
5114 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co.,
1114 W. Monroe St., Chicago, Ill.
Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and
Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466,
Pittsburgh, Pa.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co.,
2501 Liberty Ave., Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

GENERATING SETS

Fairbanks, Morse & Co., 600 So.
Wabash Ave., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Mfg. Co.,
1088 Ivanhoe Rd., Cleveland, O.

GENERATORS (Acetylene—Portable and Stationary)

Linde Air Products Co., The,
30 E. 42nd St., New York City.

GENERATORS (Electric)

Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
Chicago Electric Co., 1318 W.
Cermak Rd., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The,
Cleveland, O., Dept. 20-6.
Reliance Electric & Mfg. Co.,
1088 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

GRABS — FOR SHEETS, COILS, INGOTS

J-B Engineering Sales Co.,
New Haven, Conn.

GRATING

Blaw-Knox Co., Blawnox, Pa.
Dravo Corp. (Machinery Div.),
Neville Island, Pittsburgh, Pa.
Tri-Lok Co., Neville Island,
Pittsburgh, Pa.

GREASE (Lubricating—See LUBRICANTS (Industrial))**GREASE RETAINERS AND SEALS**

Chicago Rawhide Mfg. Co.,
1308 Elston Ave., Chicago, Ill.

GRINDERS (Pedestal, High Speed)

Sawyer Electrical Mfg. Co.,
5715 Leneve St., Los Angeles Cal.

GRINDERS (Portable—Pneumatic)

Ingersoll-Rand Co.,
11 Broadway, New York City.

GRINDERS (Precision Thread)

Jones & Lamson Machine Co.,
Springfield, Vt.

GRINDERS (Surface)

Heald Machine Co.,
Worcester, Mass.

GRINDING COMPOUNDS

Houghton, E. F., & Co., 240 W.
Somerset St., Philadelphia, Pa.
Sun Oil Co., 1608 Walnut St.,
Philadelphia, Pa.

GRINDING MACHINES (Automotive Reconditioning)

Heald Machine Co.,
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Landis Tool Company,
Waynesboro, Pa.

GRINDING MACHINES (Centerless, Internal and External)

Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.
Heald Machine Co.,
Worcester, Mass.

GRINDING MACHINES (Chucking)

Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.
Heald Machine Co.,
Worcester, Mass.
Landis Tool Company,
Waynesboro, Pa.

GRINDING MACHINES (Crank Pin, Cam, Piston, Valve Face)

Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.
Landis Tool Company,
Waynesboro, Pa.

GRINDING MACHINES (Oscillating)

Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.
Landis Tool Company,
Waynesboro, Pa.

GRINDING MACHINES (Plain and Universal)

Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)

Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Landis Tool Co., Waynesboro, Pa.
Mesta Machine Co., P. O. Box 1466,
Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)

Heald Machine Co.,
Worcester, Mass.

GRINDING MACHINES (Swing Frame)

Excelsior Tool & Machine Co.,
Ridge and Jefferson Aves.,
East St. Louis, Ill.

GRINDING MACHINES (Tool and Cutter)

Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING WHEELS

Abrasive Co., Taconey & Fraley Sts.,
Philadelphia, Pa.
Carborundum Co., The,
Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

GUIDE SHOES

Youngtown Alloy Casting Corp.,
103 E. Indiana Ave.,
Youngstown, O.

GUIDES (Mill)

National-Erie Corp., Erie, Pa.

GUNS (Blast Furnace Mud)

Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

GUNS (Steam, Hydraulic, Electric)

Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

HACK SAWS

Simonds Saw & Steel Co.,
Fitchburg, Mass.

HAMMER BOARDS

Irwin, H. G. Lumber Co.,
822 E. 8th St., Erie, Pa.

HAMMERS (Chipping, Riveting, Calking)

Ingersoll-Rand Co.,
11 Broadway, New York City.

HAMMERS (Drop)

Alliance Machine Co., The,
Alliance, O.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Industrial Brownhoist Corp.,
Bay City, Mich.
Morgan Engineering Co., The,
Alliance, O.

HAMMERS (Steam)

Alliance Machine Co., The,
Alliance, O.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp.,
Bay City, Mich.
Morgan Engineering Co., The,
Alliance, O.

HANGERS

Ahlberg Bearing Co., 3025 W. 47th
St., Chicago, Ill.
SKF Industries, Inc., Front St. and
Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)

Bantam Bearings Corp.,
South Bend, Ind.
Fafnir Bearing Co.,
New Britain, Conn.
Hyatt Bearings Division,
General Motors Corp.,
Harrison, N. J.
New Departure Div., General
Motors Corp., Bristol, Conn.
Shafer Bearing Corp.,
35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and
Erie Ave., Philadelphia, Pa.

HARDENING—See Case HARDENING**HARDENING**

HARDWARE SPECIALTIES
Budd, Edw. G. Mfg. Co.,
25th St. & Huntington Park Ave.,
Philadelphia, Pa.
Peoria Malleable Castings Co.,
Peoria, Ill.

HEAT TREATING MATERIALS

Houghton, E. F., & Co., 240 W.
Somerset St., Philadelphia, Pa.

HEATERS (Air)

Babcock & Wilcox Co., The,
19 Recto St., New York City.

HEATERS (Unit)

Dravo Corp. (Machinery Div.),
Neville Island, Pittsburgh, Pa.

HITCHINGS (Mine Car)

American Chain & Cable Co.,
Bridgeport, Conn.

HOBBIING MACHINES

Barber Colman Co.,
150 Loomis St., Rockford, Ill.

HOBBS

Barber Colman Co.,
150 Loomis St., Rockford, Ill.

HOISTS (Chain)

American Chain & Cable Co.,
Bridgeport, Conn.
Ford Chain Block Co., York, Pa.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

HOISTS (Electric)

American Chain & Cable Co.,
Bridgeport, Conn.
American Engineering Co.,
2484 Aramingo Ave.,
Philadelphia, Pa.

American MonoRail

13107 Athens Ave.,
Atlas Car & Mfg. Co.,
1140 Ivanhoe Rd.,
Cleveland, Tenn.
land Crane & Eng.
Wickliffe, O.
Ford Chain Block Co.
Harnischfeger Corp.,
ational Ave., Milw.
Industrial Brownhoist
Bay City, Mich.
Shaw-Box Crane &
Manning, Maxwell
406 Broadway,
Shepard Niles Crane
Montour Falls, N. Y.
Yale & Towne Mfg.
4530 Tacony St., P.

HOISTS (Monorail)

American Chain & C
Bridgeport, Conn.
American Engineering
2484 Aramingo A
Philadelphia, Pa.
American MonoRail
13107 Athens Ave.
Cleveland, Tenn.
land Crane & Eng.
Wickliffe, O.
Harnischfeger Corp.
ational Ave., Milw.
Shaw-Box Crane &
Manning, Maxwell
406 Broadway,
Shepard Niles Crane
Montour Falls, N. Y.
Yale & Towne Mfg.
4530 Tacony St., P.

HOISTS (Pneumatic)

Curtis, Pneumatic
1906 Kilen Ave.,
Ingersoll-Rand Co.,
11 Broadway, New

HOOKS (Chain)

American Chain & C
Bridgeport, Conn.

HOOPS AND BANDS

Allegheny Ludlum S
Oliver Bldg., Pitt
American Steel & W
Rockefeller Bldg.,
Carnegie-Illinois Stee
Pittsburgh-Chicago
Columbia Steel Co.,
San Francisco,
Ryerson, Jos. T., &
16th & Rockwell St.
Stanley Works, The
New Britain, Conn.
Bridgeport, Conn.
Tennessee Coal, Iron
Co., Brown-Mar
Birmingham, Ala.
Youngstown Sheet &
Youngstown, O.

HOSE (Flexible Metal)

American Brass Co.,
American Metal H
Waterbury, Conn.

HOSE (Rubber)

Goodyear Tire & Rub
Akron, O.
United States Rubbe
1790 Broadway, N.

HYDRAULIC MACHINES

Alliance Machine C
Alliance, O.
Allis-Chalmers Mfg.
Milwaukee, Wis.
Bethlehem Steel Co.
Bethlehem, Pa.
Chambersburg Engi
Chambersburg, P.
Farrel-Birmingham
110 Main St., An
344 Vulcan St., Bu
Hannifin Mfg. Co.,
mar Ave., Chicag
Lake Erie Engineeri
Kenmore Sta., Bu
Morgan Engineering
Alliance, O.
National-Erie Corp.,
Wood, R. D., Co., 40
Philadelphia, Pa.

HYDRAULIC PRESSES

FRESSES (Hydra

INDICATORS (Ten)

American Gas Furn
Elizabeth, N. J.
Brown Instrument
neapolis Honeywe
Co., 4462 Wayne
Philadelphia, Pa.
Foxboro Co., The
Ave., Foxboro, C
Leeds & Northrup
Ave., Philadelphia

INDICATORS (Blas)

Stock Line)
Brosius, Edgar E.
Sharpsburg, Pa.

HERE-TO-BUY

LADLES
Petroleum Iron Works Co.,
Sharon, Pa.

LAMPS (Filaments)
General Electric Co.,
Nela Park, Cleveland, O.

LAMPS (Mercury Vapor)
General Electric Vapor Lamp Co.,
885 Adams St., Hoboken, N. J.

LAMPS (Neon Glow)
General Electric Vapor Lamp Co.,
885 Adams St., Hoboken, N. J.

LAPPING MACHINES
Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.

LARRIES (Coal)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.

LATHES
LeBlond, R. K., Machine Tool Co.,
2694 Madison Rd., Cincinnati, O.

LATHES (Automatic)
Jones & Lamson Machine Co.,
Springfield, Vt.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.

LATHES (Roll Turning)
Hyde Park Foundry & Machine Co.,
Hyde Park, Pa.

LATHES (Roll Turning)
Lewis Fdry. & Mach. Co.,
P. O. Box 1586, Pittsburgh, Pa.

LATHES (Roll Turning)
Mackintosh-Hemphill Co., 9th and
Bingham Sts., Pittsburgh, Pa.

LATHES (Roll Turning)
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.

LATHES (Roll Turning)
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

LATHES (Turret)
Bullard Company, The,
Bridgeport, Conn.

LATHES (Turret)
Jones & Lamson Machine Co.,
Springfield, Vt.

LATHES (Turret)
(Automatic Vertical)
Bullard Company, The,
Bridgeport, Conn.

**LEAD (Chemical, Corroding,
Desilvered)**
St. Joseph Lead Co.,
250 Park Ave., New York City.

LEAD (Tellurium)
National Lead Co.,
111 Broadway, New York City.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.

LEVELING MACHINES
Hyde Park Foundry & Machine Co.,
Hyde Park, Pa.

LEVELING MACHINES
McKay Machine Co.,
Youngstown, O.

LEVELING MACHINES
Mesta Machine Co., P. O. Box 1466,
Pittsburgh, Pa.

LEVELING MACHINES
Sutton Engineering Co., Park Bldg.,
Pittsburgh, Pa.

LEVELING MACHINES
Wean Engineering Co., Warren, O.

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TREATMENT EQUIPMENT**
Wilputte Coke Oven Corp.,
570 Lexington Ave.,
New York City.

**LIFT TRUCKS—See TRUCKS
(Lift)**

**LIFTING MAGNETS—See
MAGNETS (Lifting)**

LIGHTING (Industrial)
General Electric Vapor Lamp Co.,
885 Adams St., Hoboken, N. J.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

**LININGS—for Soaking Pits and
Ladles**
National Stone Co.,
Ellwood City, Pa.

**LOCOMOTIVE CRANES—See
CRANES (Locomotive)**

LOCOMOTIVES (Diesel-Electric)
Whitcomb Locomotive Div., The
Baldwin Locomotive Works,
Paschall P. O., Philadelphia, Pa.

**LOCOMOTIVES (Diesel Mechan-
ical)**
Whitcomb Locomotive Div., The
Baldwin Locomotive Works,
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Baldwin Locomotive Works, Pas-
schall P. O. Sta., Philadelphia, Pa.

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General Electric Co.,
Schenectady, N. Y.
Whitcomb Locomotive Division, The
Baldwin Locomotive Works, Pas-
schall P. O. Sta., Philadelphia, Pa.

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chanical)**
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Baldwin Locomotive Works,
Paschall P. O., Philadelphia, Pa.

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Ingersoll-Rand Co.,
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Whitcomb Locomotive Division, The
Baldwin Locomotive Works, Pas-
schall P. O. Sta., Philadelphia, Pa.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
General Electric Co.,
Schenectady, N. Y.
Whitcomb Locomotive Division, The
Baldwin Locomotive Works, Pas-
schall P. O. Sta., Philadelphia, Pa.

LUBRICANTS (Industrial)
American Lanolin Corp.,
Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna.,
Gulf Refining Co., 3800 Gulf Bldg.,
Pittsburgh, Pa.
Houghton, E. F. & Co., 240 W.
Somerset St., Philadelphia, Pa.
New York & New Jersey Lubricant
Co., 292 Madison Ave.,
New York City.

Penola, Inc., 34th & Smallman Sts.,
Pittsburgh, Pa.
Pure Oil Co., The,
35 E. Wacker Dr., Chicago, Ill.
Shell Union Oil Corp.,
50 W. 50th St., New York City.
Socony Vacuum Oil Co., Inc.,
26 Broadway, New York City.
Sun Oil Co.,
1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co.,
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Farval Corp.,
3270 E. 80th St., Cleveland, O.

MACHINE WORK
Budd, Edw. G., Mfg. Co.,
25th St. & Huntington Park Ave.,
Philadelphia, Pa.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock
Co., Kearney, N. J.
Hyde Park Foundry & Machine Co.,
Hyde Park, Pa.
Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The,
Alliance, O.

MACHINERY (Second Hand)
Marr-Galbreath Machinery Co.,
53 Water St., Pittsburgh, Pa.
West Penn Machinery Co.,
1208 House Bldg., Pittsburgh, Pa.

MACHINERY (Special)
Alliance Machine Co., The,
Alliance, O.
Allis-Chalmers Mfg. Co., The,
Milwaukee, Wis.
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Birdsboro Steel Fdry. & Mach. Co.,
Birdsboro, Pa.
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.
Cleveland Punch & Shear Works,
3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co.,
955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Foot Bros. Gear & Machine Corp.,
5301 S. Western Ave., Chicago, Ill.
Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.
Morgan Engineering Co., The,
Alliance, O.
National-Erie Corp., Erie, Pa.

National Roll & Fdry. Co., The,
Avonmore, Pa.
Niagara Machine & Tool Works,
637 Northland Ave.,
Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Shuster, F. B., Co., The,
New Haven, Conn.
Sleeper & Hartley, Inc.,
Worcester, Mass.
Thomas Machine Mfg. Co.,
Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

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Dings Magnetic Separator Co.,
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Electric Controller & Mfg. Co.,
2938 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Dings Magnetic Separator Co.,
675 Smith St., Milwaukee, Wis.
Ohio Electric Mfg. Co., The,
5906 Maurice Ave., Cleveland, O.

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ALLOYS**
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MANGANESE ORE
Samuel, Frank, Co., Inc.,
Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Alliance Machine Co., The,
Alliance, O.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Morgan Engineering Co., The,
Alliance, O.

MARKERS (Industrial)
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325 W. Huron St., Chicago, Ill.

MARKING DEVICES
Helmer-Staley, Inc.,
325 W. Huron St., Chicago, Ill.

**METAL (Perforated)—See
PERFORATED METAL**

**METAL BLAST ABRASIVES
(Shot and Grit)**
Pittsburgh Crushed Steel Co.,
61st St. and A. V. R. R.,
Pittsburgh, Pa.

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American Chemical Paint Co.,
Ambler, Pa.
Houghton, E. F. & Co., 240 W.
Somerset St., Philadelphia, Pa.
Pennsylvania Salt Mfg. Co., 1000
Widener Bldg., Philadelphia, Pa.

**METAL SPECIALTIES AND
PARTS—See STAMPINGS**

**METAL STAMPINGS—See
STAMPINGS**

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Brown & Sharpe Mfg. Co.,
Providence, R. I.

MILLING MACHINES
Brown & Sharpe Mfg. Co.,
Providence, R. I.
Cincinnati Milling Machine Co.,
Oakley Sta., Cincinnati, O.

**MILLING MACHINES (Milling
and Centering Combined)**
Jones & Lamson Machine Co.,
Springfield, Vt.

**MILLS (Bloom, Universal, Plate,
Sheet, Tin, Bar, Strip, Etc.)—See
ROLLING MILL EQUIPMENT**

**MOLDS (Ingot)—See INGOT
MOLDS**

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Climax Molybdenum Co.,
500 Fifth Ave., New York City.
Vanadium Corp. of America, 420
Lexington Ave., New York City.

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International Nickel Co., Inc., The,
67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The,
13107 Athens Ave., Cleveland, O.

Cleveland Tramrail Div. of Cleve-
land Crane & Engineering Co.,
Wickliffe, Pa.
Shepard Niles Crane & Holst Corp.,
Montour Falls, N. Y.

MOTORS (Electric)
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
Chicago Electric Co., 1318 W.
Cermak Rd., Chicago, Ill.
Fairbanks, Morse & Co.,
600 So. Wabash Ave., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Lincoln Electric Co., The,
Cleveland, O., Dept. 20-6.
Reliance Electric & Mfg. Co.,
1088 Ivanhoe Rd., Cleveland, O.
Sawyer Electrical Mfg. Co.,
5715 Leneve St., Los Angeles, Cal.
Sturtevant, B. F., Co.,
Hyde Park, Boston, Mass.
Wagner Electric Corp.,
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Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

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Harrison Bldg., Philadelphia, Pa.

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Bethlehem Steel Co.,
Bethlehem, Pa.
Columbia Steel Co.,
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Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
*Pittsburgh Steel Co.,
Grant Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST.
Tennessee Coal, Iron & Railroad Co.,
Brown-Marx Bldg.,
Birmingham, Ala.
Wickwire Brothers,
189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co.,
41 E. 42nd St., New York City.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St.,
Cortland, N. Y.

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International Nickel Co., Inc., The,
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Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST,
Cleveland, O.
Union Drawn Steel Co.,
Massillon, O.

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Cleveland Cap & Screw Co.,
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Ohio Nut & Bolt Co., The,
600 Front St., Berea, O.
*Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.
Tinnerman Stove & Range Co.,
2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.

NUTS (Cold Punched)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw Co.,
2935 E. 79th St., Cleveland, O.
Ohio Nut & Bolt Co., The,
600 Front St., Berea, O.
Republic Steel Corp.,
Upson Nut Div., Dept. ST,
1912 Scranton Rd., Cleveland, O.
Russell, Burdall & Ward Bolt &
Nut Co., Port Chester, N. Y.

NUTS (Hot Pressed)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw
2935 E. 79th St.,
Republic Steel Corp.,
Upson Nut Div., Dept.
1912 Scranton Rd.,
Russell, Burdall &
Nut Co., Port Chester

NUTS (Semi-Finished)
Bethlehem Steel Co.,
Bethlehem, Pa.
Cleveland Cap Screw
2935 E. 79th St.,
Republic Steel Corp.,
Upson Nut Div., Dept.
1912 Scranton Rd.,
Russell, Burdall &
Nut Co., Port Chester

NUTS (Wing)
Parker-Kalon Corp.,
200 Varick St., New

**OIL RETAINERS AND
CHARGES**
Chicago Rawhide Mfg.
1308 Elston Ave., E.

OILS (Cutting)
Gulf Oil Corp. of Penn.
Gulf Refining Co.,
3800 Gulf Bldg., Pitts-
burgh, Pa.
Houghton, E. F. & Co.,
Somerset St., Philad-
Penola, Inc., 34th & S-
Pittsburgh, Pa.
Pure Oil Co., The,
35 E. Wacker Dr., Chi-
Shell Union Oil Corp.,
50 W. 50th St., New
Sipe, James B., & Co.,
So. Hills Branch, Phil-
Socony-Vacuum Oil Co.,
26 Broadway, New
Sun Oil Co., 1608 Wal-
Philadelphia, Pa.
Tide Water Associated
17 Battery Place, New

OILS (Drawing)
Houghton, E. F. & Co.,
Somerset St., Philad-

**OILS (Lubricating)—See
LUBRICANTS (Indus-
trial)**

OILS (Paint)
Sipe, James B., & Co.,
So. Hills Branch, Phil-

OILS (Rust Preventive)
American Chemical Paint
Ambler, Pa.
Sipe, James B., & Co.,
So. Hills Branch, Phil-

**OPEN-HEARTH FUR-
NACES (Open-Hea-
th)**

**OVENS (Annealing, Ja-
tempering)**
Hagan, Geo. J., Co.,
2400 E. Carson St., P-
Stewart Furnace Div.,
Chicago Flexible St-
1106 So. Central Ave.

**OVENS (Coke, By-Pro-
duct)**
Koppers Co., Engineer-
struction Div., Pitts-

OVENS (Core and Mould)
Pennsylvania Industries
2413 W. Magnolia S-
Pittsburgh, Pa.

**OXY-ACETYLENE
AND CUTTING—See
WELDING**

OXYGEN IN CYLINDERS
Air Reduction Sales Co.,
60 E. 42nd St., New
Linde Air Products Co.,
30 E. 42nd St., New
National Cylinder Gas
205 W. Wacker Dr.,
Chicago, Ill.

**PACKING (Asbestos or
Goodyear Tire & Rubber
Akron, O.)**
Johns-Manville Corp.,
22 E. 40th St., New
United States Rubber
1790 Broadway, New

**PACKINGS—MECHAN-
ICAL (Cup, U and
Vee)**
Chicago Rawhide Mfg.
1308 Elston Ave., Phil-
Houghton, E. F. & Co.,
Somerset St., Philad-

**PAINT (Alkali Resist-
ant)**
Pennsylvania Salt Mfg.
Widener Bldg., Phil-
Sipe, James B., & Co.,
So. Hills Branch, Phil-

PAINT (Aluminum)
Koppers Co., Tar & Co.,
Pittsburgh, Pa.
Sipe, James B., & Co.,
So. Hills Branch, Phil-

(existing)
cal Paint Co.,
& Co. Inc.,
th, Pittsburgh, Pa.
(a)
& Co. Inc.,
th, Pittsburgh, Pa.
(g)
nc.,
St. Chicago, Ill.
r & Chemical Div.,
a.
& Co. Inc.,
th, Pittsburgh, Pa.
(ment)
cal Paint Co.,
& Co. Inc.,
th, Pittsburgh, Pa.
(reventive)
cal Paint Co.,
r & Chemical Div.,
a.
& Co. Inc.,
th, Pittsburgh, Pa.
(Form)
Inc.,
St., Chicago, Ill.
METAL
ting Co.,
Pi, Chicago, Ill.
ng Co.,
Rochester, N. Y.
l Perforating Co.,
St., Chicago, Ill.
er Steel Co.,
h, New York City.
VERY PLANTS
ngineering and Con-
Pittsburgh, Pa.
Oven Corp.,
Ave.,
y.
FOUND
cal Paint Co.,
, & Co., 240 W.
Philadelphia, Pa.
Co., The,
Bldg.,
a.
lt Mfg. Co., 1000
Philadelphia, Pa.
PIPMENT
ckel Co., Inc., The,
New York City.
CHINERY
o., Erie, Pa.,
& Machine Co.,
86, Pittsburgh, Pa.
Co.,
6, Pittsburgh, Pa.
Co., Warren, O.
NK LININGS
Rubber Co.,
New York City.
Co., 1443 W. Market
ls. O.,
lt Mfg. Co., 1000
Philadelphia, Pa.
NKS—See TANKS
ITS
loy Casting Corp.,
nola Ave.,
a.
el Co., Pa.,
a.,
Co.,
Iron Co.,
Steel Corp.,
icago.
Iron Co. Union
Cleveland, O.
Co., The,
lt, Mich.,
Steel Co.,
n Steel Corp.,
ghlin Bldg.,
Corp., Dept. ST,
& Co. Inc.,
Philadelphia, Pa.
ce Co.,
Pittsburgh, Pa.
& Co.,
Pittsburgh, Pa.
Iron & Railroad
fax Bldg.,
Ala.,
Co.,
an Ave., Chicago, Ill.

PILING (Iron and Steel)
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Inland Steel Co., 38 South Dear-
born St., Chicago, Ill.
National Tube Co.,
Frick Bldg., Pittsburgh, Pa.
Republic Steel Co.,
Dept. ST, Cleveland, O.
PILING (Pressure-Treated Wood)
Wood Preserving Corp., The,
Koppers Bldg., Pittsburgh, Pa.
PILLOW BLOCKS (Ball)
Ahlberg Bearing Co.,
3025 W. 47th St., Chicago, Ill.
PILLOW BLOCKS (Roller Bearing)
Ahlberg Bearing Co., 3025 W. 47th
St., Chicago, Ill.
Link-Belt Co., 515 N. Holmes Ave.,
Indianapolis, Ind.
Shafer Bearing Corp.,
35 E. Wacker Drive, Chicago, Ill.
PILLOW BOXES
SKF Industries, Inc., Front St. and
Erie Ave., Philadelphia, Pa.
PINIONS (Mill)
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The,
5114 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The,
2501 Liberty St., Pittsburgh, Pa.
United Engineering & Foundry Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
PINS (Taper)
Moltrup Steel Products Co.,
Beaver Falls, Pa.
**PIPE (Brass, Bronze, Copper—
Rubber or Rubber Lined)**
American Hard Rubber Co.,
11 Mercer St., New York City.
PIPE (Brass, Bronze, Copper)
American Brass Co., The,
25 Broadway, New York City.
Bridgeport Brass Co.,
Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.
PIPE (New and Used)
Foster, L. B., Co., Inc.,
P. O. Box 1647, Pittsburgh, Pa.
PIPE (Square and Rectangular)
Youngtown Sheet & Tube Co.,
Youngtown, O.
PIPE (Steel)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The,
Middletown, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Columbia Steel Co.,
San Francisco, Calif.
Crane Co., The, 836 So. Michigan
Bldv., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg.,
St. Louis, Mo.
National Tube Co.,
Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Western Gas Div., The Koppers
Co., Fort Wayne, Ind.
Youngtown Sheet & Tube Co.,
The, Youngtown, O.
PIPE BALLS
Youngtown Alloy Casting Corp.,
103 E. Indiana Ave.,
Youngtown, O.
PIPE BENDING
Crane Co., The, 836 So. Michigan
Bldv., Chicago, Ill.
**PIPE CUTTING AND THREAD-
ING MACHINERY**
Landis Machine Co., Inc.,
Waynesboro, Pa.
PIPE ELIMINATORS
Alpha-Lux Co., Inc.,
192 Front St., New York City.

113

PIPE FITTINGS

American Hard Rubber Co.,
11 Mercer St., New York City.
Babcock & Wilcox Co., The,
19 Rector St., New York City.
Crane Co., The, 836 So. Michigan
Blvd., Chicago, Ill.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machy. Corp.,
Harrison, N. J.

PIPE LINES (Riveted and Welded)

Bethlehem Steel Co.,
Bethlehem, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.

PIPE MILL MACHINERY

United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

PIPE STRAIGHTENING MACHINERY

Logeman Brothers Co., 3126 Bur-
leigh St., Milwaukee, Wis.
Sutton Engineering Co.,
McKees Rocks, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

PIPE TOOLS

Greenfield Tap & Die Corp.,
Greenfield, Mass.

PIPING CONTRACTORS

Power Piping Co., Beaver and
Western Ave., Pittsburgh, Pa.

PISTON RINGS

American Hammered Piston Ring
Div., The Koppers Co.,
Baltimore, Md.

PISTON RODS

Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bay City Forge Co., W. 19th and
Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield
Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Kropp Forge Co., 5301 W. Roose-
velt Blvd., Chicago, Ill.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.
Republic Steel Corp.,
Dept. ST, Cleveland, O.
Standard Steel Works Co.,
Paschall P. O., Philadelphia, Pa.
Union Drawn Steel Co.,
Massillon, O.

PLANERS AND SHAPERS

Cincinnati Shaper Co., Elam and
Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works,
3917 St. Clair Ave., Cleveland, O.

PLATE CASTORS

Hyatt Bearings Div., General Mo-
tors Corp., Harrison, N. J.

PLATES (Sheared or Universal)

(*Also Stainless)
*Alan Wood Steel Co.,
Conshohocken, Pa.
*Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co.,
Middletown, O.
*Bethlehem Steel Co.,
Bethlehem, Pa.
*Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Granite City Steel Co.,
Granite City, Ill.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
*Republic Steel Corp.,
Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc.,
16th and Rockwell Sts.,
Chicago, Ill.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

PLATES (Stainless Clad)

Granite City Steel Co.,
Granite City, Ill.

PLATES (Steel-Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLUGS (Expansion)
Hubbard, M. D., Spring Co.,
613 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp.,
103 E. Indianola Ave.,
Youngstown, O.

PLUGS (Rubber)
Rhoades, R. W., Metaline Co.,
50 Third St., Long Island City,
N. Y.

POLES (Tubular Steel)
National Tube Co.,
Frick Bldg., Pittsburgh, Pa.

POLISHING MACHINERY
(Tube and Bar)
Medart Co., The, 3500 de Kalb
St., St. Louis, Mo.

POLISHING MACHINES, AUTO-
MATIC (Stainless Steel)
Excelsior Tool & Machine Co.,
Ridge and Jefferson Aves.,
East St. Louis, Ill.

POTS (Case Hardening)
Pressed Steel Tank Co.,
Milwaukee, Wis.

POTS (Melting)
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Kemp, C. M., Mfg. Co.,
405 E. Oliver St., Baltimore, Md.

PRECIPIATORS (Cottrell
Electric)
Research Corp., 405 Lexington
Ave., New York City.
Western Precipitation Corp.,
1016 W. 9th St., Los Angeles,
Calif.

PREHEATERS
Babcock & Wilcox Co., The,
19 Rector St., New York City.

PRESSED METAL PARTS
Stanley Works, The, Pressed Metal
Div., New Britain, Conn.

PRESSES
Cleveland Punch & Shear Works,
3917 St. Clair Ave., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.

Logeman Brothers Co., 3126 Bur-
leigh St., Milwaukee, Wis.
Niagara Machine & Tool Works,
637 Northland Ave.,
Buffalo, N. Y.
Tomkins-Johnson Co.,
611 N. Mechanics St.,
Jackson, Mich.

PRESSES (Forging)
Erie Foundry Co., Erie, Pa.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co.,
Alliance, O.

United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and
Garrard Sts., Cincinnati, O.

PRESSES (Hydraulic)
Birdsboro Steel Fdry. & Mach. Co.,
Birdsboro, Pa.
Chambersburg Engineering Co.,
Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc.,
110 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.

Hannifin Mfg. Co., 621-631 So.
Kolmar Ave., Chicago, Ill.
Lake Erie Engineering Corp.,
Kenmore St., Buffalo, N. Y.

Logeman Brothers Co., 3126 Bur-
leigh St., Milwaukee, Wis.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The,
Alliance, O.

National-Erie Corp., Erie, Pa.
Wood, R. D. Co., 400 Chestnut St.,
Philadelphia, Pa.

PRESSES (Punching, Drawing,
Coining, Blanking, etc.)
Cleveland Punch & Shear Works, The,
3917 St. Clair Ave., Cleveland, O.

Niagara Machine & Tool Works,
637-697 Northland Ave.,
Buffalo, N. Y.

PRESSES (Riveting)

Hannifin Mfg. Co., 621-631 So.
Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)

Logeman Brothers Co., 3126 Bur-
leigh St., Milwaukee, Wis.

PRESSES (Welding)—See WELDERS

PRESSURE VESSELS
Babcock & Wilcox Co., The,
19 Rector St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces
and Sintering Plants)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Dings Magnetic Separator Co.,
675 Smith St., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1249
Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.),
Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
American Hard Rubber Co.,
11 Mercer St., New York City.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.

PUMPS (Boiler Feed)
Worthington Pump & Machinery
Corp., Harrison, N. J.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co.,
Milwaukee, Wis.
American Hard Rubber Co.,
11 Mercer St., New York City.

Fairbanks, Morse & Co.,
600 So. Wabash Ave.,
Chicago, Ill.

Ingersoll-Rand Co.,
11 Broadway, New York City.
Tomkins-Johnson Co.,
611 N. Mechanics St.,
Jackson, Mich.

Worthington Pump & Machinery
Corp., Harrison, N. J.

PUMPS (Hydraulic)
Logeman Brothers Co., 3126 Bur-
leigh St., Milwaukee, Wis.
Vickers, Inc., 1400 Oakman Blvd.,
Detroit, Mich.

Wood, R. D. Co., 400 Chestnut
St., Philadelphia, Pa.
Worthington Pump & Machinery
Corp., Harrison, N. J.

PUMPS (Rotary)
Roper, Geo. D. Co.,
Rockford, Ill.

Vickers, Inc., 1400 Oakman Blvd.,
Detroit, Mich.

PUMPS (Vacuum)
Ingersoll-Rand Co.,
11 Broadway, New York City.

Worthington Pump & Machinery
Corp., Harrison, N. J.

PUNCHES (Multiple)
Cincinnati Shaper Co., Elam and
Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works, The,
3917 St. Clair Ave., Cleveland, O.

PUNCHING AND SHEARING
MACHINERY
Beatty Machine & Mfg. Co.,
Hammond, Ind.

Chambersburg Engineering Co.,
Chambersburg, Pa.
Cleveland Punch & Shear Works,
3917 St. Clair Ave., Cleveland, O.

Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.

Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.

Morgan Engineering Co., The,
Alliance, O.
Niagara Machine & Tool Works,
637 Northland Ave., Buffalo,
N. Y.

Thomas Machine Mfg. Co.,
Pittsburgh, Pa.
United Engineering & Fdry. Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
American Gas Furnace Co.,
Elizabeth, N. J.

Brown Instrument Div.,
neapolis Honeywell &
Co., 4462 Wayne Av.,
Philadelphia, Pa.
Foxboro Co., The, 118
Ave., Foxboro, Mass.
Leeds & Northrup Co.,
ton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry
Avonmore, Pa.
United Engineering &
First National Bank
Pittsburgh, Pa.

RAILS (New and Re-
Foster, L. B., Co., In-
P. O. Box 1647, Pitts-

RAILS (Steel)
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel
Pittsburgh-Chicago

Columbia Steel Co.,
San Francisco, Calif.
Inland Steel Co., 38 S.
St., Chicago, Ill.

Tennessee Coal, Iron &
Co., Brown-Marx Bldg.,
Birmingham, Ala.

Weirton Steel Co., W-4

RAMS
American Hollow Bore
1054 W. 20th St., Erie

REAMERS
Barber Colman Co.,
150 Loomis St., Roch-
Brown & Sharpe Mfg.
Providence, R. I.

Cleveland Twist Drill
1242 E. 49th St., Cle-
Greenfield Tap & Die
Greenfield, Mass.

REAMERS (Pneumatic)
Ingersoll-Rand Co.,
11 Broadway, New York

REAMERS (Sand, Ing-
Pneumatic)
Ingersoll-Rand Co.,
11 Broadway, New York

REBUILT EQUIPMENT
Marr-Galbreath Machn-
53 Water St., Pitts-
West Penn Machinery
1208 House Bldg., Pitt-

RECEIVERS
Petroleum Iron Works
Sharon, Pa.
Pressed Steel Tank Co.
Milwaukee, Wis.

RECORDERS (Combustion
Hays Corp., The, 960 E.
Michigan City, Ind.

RECORDERS (Pressure
Temperature, Time)
Brown Instrument Div.,
neapolis Honeywell &
Co., 4462 Wayne Av.,
Philadelphia, Pa.

Foxboro Co., The, 118
Ave., Foxboro, Mass.
Leeds & Northrup Co.,
ton Ave., Philadelphia

REDUCERS (Speed)—
REDUCERS

REDUCTION GEARS
Farrel-Birmingham Co.,
110 Main St., Anso-
344 Vulcan St., Bu-

Footo Bros. Gear & Ma-
5301 S. Western Ave.,
Horsburgh & Scott Co.,
Hamilton Ave., Cleve-

National-Erie Corp., E-
Sturtevant, B. F. Co.,
Hyde Park, Boston, Mass.

REFRACTORIES (Fire)
Babcock & Wilcox Co.,
19 Rector St., New York

Eureka Fire Brick Co.,
Jones Law Bldg., Phil-
Keagler Brick Co., 144-
St., Steubenville, O.

REFRACTORIES (For
Frequency Furnaces)
Ajax Electrothermic Co.,
Ajax Park, Trenton,
Carborundum Co., The
Perth Amboy, N. J.

REFRACTORIES (High
Temperature)
Alpha-Lux Co., Inc.,
192 Front St., New

REFRACTORIES (Silica)
Alpha-Lux Co., Inc.,
192 Front St., New

REFRACTORIES (Silica)
Carborundum Co., The
Perth Amboy, N. J.

Norton Co., Worcester,

HERE-TO-BUY

(Pressure)
ler & Mfg. Co.,
St., Cleveland, O.

(Temperature)
ent Div. of Min-
eywell Regulator
ayne Ave.,
Pa.

to, 118 Neponset
o, Mass.

rup Co., 4901 Sten-
Philadelphia, Pa.

ENT FABRIC
(ided)
g. & Wire Co.,
dg., Cleveland, O.
Co.
o, Calif.
er Steel Co.,
t., New York City.

Edgewood)
r Co., The,
d St., Cleveland, O.

raphite Disc)
Co., 1326 So. 2nd
ee, Wis.

(Plating)
ler & Mfg. Co.,
St., Cleveland, O.

um Steel Corp.,
Pittsburgh, Pa.
e Co., W. 19th and
s., Erie, Pa.
rgings Co.,
St., Cleveland, O.
o, 47th & Hatfield
gh, Pa.
el Co., 5027 Beau-
Philadelphia, Pa.
o, 5301 W. Roose-
Chicago, Ill.
Products Co.,
Pa.
& Ordnance Co.,
en Co., Pa.
Works Co.,
Philadelphia, Pa.
Forging Co.,
St., Buffalo, N. Y.

Steel)
el Co., 5027 Beau-
Philadelphia, Pa.
Welding Works,
on St., Chicago, Ill.

ss)
e)
rgings Co.,
St., Cleveland, O.
The, Nicetown,
Pa.
Forging Co.,
St., Buffalo, N. Y.

Hydraulic-Portable
ry)
Co., 621-631 So.
Chicago, Ill.

am, Pedestal,
eeze, Stationary,
tatic)
Co.,
New York City.

neumatic)
Co., 621-631 So.
Chicago, Ill.

ACHINERY
Engineering Co.,
g. Pa.
Co., The,
Conn.
on Co.,
nics St.,
Co., 400 Chestnut
phia, Pa.

ss)
Mfg. Co., The,
rd., Cleveland, O.
el Co.,
Pa.
o, 38 S. Dearborn
Ill.
g. Co.,
Conn.
Corp.,
iv., Dept. ST,
n Rd., Cleveland, O.
sail & Ward Bolt &
rt Chester, Pa.

Bronze, Copper,
Silicon-Bronze)
s Co., The,
New York City.
ss Co.,
Conn.

RODS (Drill)
Firth-Sterling Steel Co.,
McKeesport, Pa.
Fitzsimons Co., The, 1623 Wilson
Ave., Youngstown, O.
Kidd Drawn Steel Co.,
Alliquippa, Pa.

RODS (Piston)
American Hollow Boring Co.,
1054 W. 20th St., Erie, Pa.
Vulcan Steam Forging Co.,
220-250 Rano St., Buffalo, N. Y.

RODS (Rounds, Flats and Shapes)
(*Also Stainless)
*American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago,
Columbia Steel Co.,
San Francisco, Calif.
*Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
*Republic Steel Corp.,
Dept. St., Cleveland, O.
Tennessee Coal, Iron & Railroad Co.
Brown Marx Bldg.,
Birmingham, Ala.
Timken Steel & Tube Co.,
Canton, O.
Titan Metal Mfg. Co.,
Bellevue, Pa.
Washburn Wire Co.,
Phillipsdale, R. I.
Youngstown Sheet & Tube Co.,
Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co.,
McKeesport, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.

RODS (Welding)—See **WELDING**
RODS

RODS (Wire)—See **WIRE**
PRODUCTS

ROLL COOLERS (Internal, Water)
Hunt, C. B., & Son, Salem, O.

ROLLERS (Rubber)
Goodyear Tire & Rubber Co.,
Akron, O.

ROLLING DOORS & SHUTTERS—
SEE **DOORS & SHUTTERS**

ROLLING MILL BEARINGS—See
BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Alliance Machine Co., The,
Alliance, O.
Birdsboro Steel Fdry. & Mach. Co.,
Birdsboro, Pa.
Continental Roll & Steel Fdry. Co.,
E. Chicago, Ind.
Farrel-Birmingham Co., Inc.,
130 Main St., Ansonia, Conn.
344 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co.,
Hyde Park, Pa.
Lewis Fdry. & Mach. Co.,
P. O. Box 1586, Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and
Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co.,
P. O. Box 1466, Pittsburgh, Pa.
Morgan Construction Co.,
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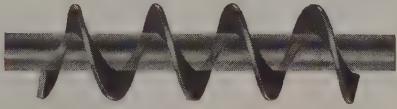
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Spring Corp., Corry, Pa.
Standard Steel Works Co.,
Paschall P. O., Philadelphia, Pa.
Washburn Wire Co., 118th St.,
& Harlem River, New York City.
Wickwire Spencer Steel Co.,
41 E. 42nd St., New York City.

SPRINGS (Oil Tempered—Flat)
Davis Brake Beam Co., Laurel Ave.,
& P. R. R., Johnstown, Pa.

SPROCKETS

Chain Belt Co., 1660 W. Bruce St.,
Milwaukee, Wis.

SPRUE CUTTERS

Shuster, F. B., Co., The,
New Haven, Conn.

STACKS (Steel)—See

BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS

American Tube & Stamping Plant,
(Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div.
Associated Spring Corp.,
Bristol, Conn.
Budd, Edw. G., Mfg. Co.,
25th St. & Huntington Park Ave.,
Philadelphia, Pa.
Crosby Co., The,
183 Pratt St., Buffalo, N. Y.
Davis Brake Beam Co., Laurel Ave.,
& P. R. R., Johnstown, Pa.
Erdle Perforating Co.,
171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co.,
613 Central Ave., Pontiac, Mich.
Pressed Steel Tank Co.,
Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated
Spring Corp., Corry, Pa.
Stanley Works, The,
New Britain, Conn.
Toledo Stamping & Mfg. Co.,
99 Pearing Blvd., Toledo, O.
Whitehead Stamping Co., 1661 W.
Lafayette Blvd., Detroit, Mich.

STAPLES (Wire)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Columbia Steel Co.,
San Francisco, Calif.
Keystone Steel & Wire Co.,
Peoria, Ill.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Tennessee Coal, Iron & Railroad Co.,
Brown Marx Bldg.,
Birmingham, Ala.
Wickwire Brothers,
189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co.,
Youngstown, O.

STARTERS (Electric Motor)

Electric Controller & Mfg. Co.,
2698 E. 79th St., Cleveland, O.

STEEL (Alloy)

Alan Wood Steel Co.,
Conshohocken, Pa.
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.

Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Fitzsimons Co., The,
1623 Wilson Ave., Youngstown, O.
Heppenthal Co., 47th & Hatfield Sts.,
Pittsburgh, Pa.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Mfg. Co.,
Fitchburg, Mass.
Stanley Works, The,
New Britain, Conn.

Tennessee Coal, Iron & Railroad Co.,
Brown Marx Bldg.,
Birmingham, Ala.
Timken Steel & Tube Co.,
Canton, O.
Washburn Wire Co.,
Phillipsdale, R. I.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.

STEEL (Alloy, Cold Finished)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co.,
McKeesport, Pa.
LaSalle Steel Co., P. O. Box
6800-A, Chicago, Ill.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Union Drawn Steel Co.,
Massillon, O.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.

STEEL (Clad—Corrosion Resisting)

(*Also Stainless)
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
*Granite City Steel Co.,
Granite City, Ill.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Kidd Drawn Steel Co.,
Alliquippa, Pa.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Union Drawn Steel Co.,
Massillon, O.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

STEEL (Cold Finished)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Fitzsimons Co., The,
1623 Wilson Ave., Youngstown, O.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Moltrup Steel Products Co.,
Beaver Falls, Pa.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Co.,
Massillon, O.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co.,
First National Bank Bldg.,
Pittsburgh, Pa.

STEEL (Corrosion Resisting)

Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The,
Middletown, O.
American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The,
Newport, Ky.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.

Firth-Sterling Steel Co.,
McKeesport, Pa.
Granite City Steel Co.,
Granite City, Ill.
Inland Steel Co.,
38 So. Dearborn St.,
Jessop, Wm., & Sons,
121 Varick St., New
Midvale Co., The, Nicetown,
Philadelphia, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.
National Tube Co.,
Frick Bldg., Pitts-
burgh, Pa.
Republic Steel Corp.,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Stanley Works, The,
New Britain, Conn.
Bridgeport, Conn.
Superior Steel Corp.,
Timken Steel & Tube
Canton, O.

STEEL (Die)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Jessop, Wm., & Sons,
121 Varick St., New

STEEL (Drill)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.

STEEL (Electric)

Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Inland Steel Co.,
38 So. Dearborn St.,
Jessop, Wm., & Sons,
121 Varick St., New
Latrobe Electric Steel
Latrobe, Pa.
National Forge & Ordnance Co.,
Irvine, Warren Co., Pa.
Republic Steel Corp.,
Cleveland, O.
Timken Steel & Tube
Canton, O.

STEEL (High Speed)

Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jessop, Wm., & Sons,
121 Varick St., New
Latrobe Electric Steel
Latrobe, Pa.

STEEL (High Tensile)

Alan Wood Steel Co.,
Conshohocken, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Great Lakes Steel Co.,
Ecorse, Detroit, Mich.
Inland Steel Co.,
38 So. Dearborn St.,
Jones & Laughlin Steel Corp.,
Pittsburgh, Pa.
Republic Steel Corp.,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts.,
Tennessee Coal, Iron & Railroad Co.,
Brown Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co.,
Youngstown, O.

STEEL (Nitriding)

Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.

STEEL (Rustless)—See

(Corrosion Resisting)

STEEL (Screw Stock)

American Steel & Wire Co.,
Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co.,
Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.

WHERE-TO-BUY

(Stock)—Con.
ducts Co.,
Pa.,
Dept. ST.
& Son, Inc.,
Sts., Chicago, Ill.
eel Co.,
Steel Co.,
Bank Bldg.,
& Tube Co., The,
Wire Co.,
g., Cleveland, O.
Steel Corp.,
In Bldg.,
Co.,
Arlem River,
y.
e)—See STEEL
listing)
opper Coated)
Wire Co.,
g., Cleveland, O.
The,
Conn.
an.,
Warren, O.
ot and Cold
s)
Steel Corp.,
Pittsburgh, Pa.
g Mill Co., The,
Wire Co.,
g., Cleveland, O.
Stamping Plant,
Bridgeport, Conn.
The,
Co.,
Steel Corp.,
Cago.
Co.,
Calif.
eel Co.,
Pa.
el Corp.,
Mich.
m St., Chicago, Ill.
Sons, Inc.,
New York City.
in Steel Corp.,
hlin Bldg.,
St. Louis, Mo.
Corp., Dept. ST.
ell Sts., Chicago, Ill.
The,
Conn.
mn.
Corp., Carnegie, Pa.
Iron & Railroad Co.
Bldg.,
Ala.
J., Warren, O.
Co.,
Arlem River,
y.
Co., Weirton, W. Va.
Steel Co.,
New York City.
Co.,
an Ave., Chicago, Ill.
Tin Coated)
Wire Co.,
ldg., Cleveland, O.
The, Warren, O.
Co., 118th St. &
New York City.
Zinc Coated)
Wire Co.,
ldg., Cleveland, O.
Co., Warren, O.
Co., 118th St. &
New York City.
ural)
eal)
e Co.,
Pittsburgh, Pa.
Works, 22nd St. and
ve., Philadelphia, Pa.
Co.,
Steel Corp.,
Chicago.
Co.,
o. Calif.

Inland Steel Co.,
38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST.,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co.,
Brown Marx Bldg.,
Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co.,
180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Darwin & Milner, Inc.,
1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Jessop, Wm., & Sons Co.,
121 Varick St., New York City.
Kidd Drawn Steel Co.,
Alquippa, Pa.
Latrobe Electric Steel Co.,
Latrobe, Pa.
Midvale Co., The, Nicetown,
Philadelphia, Pa.
Republic Steel Corp., Dept. ST.,
Cleveland, O.
Ryerson, Jos. T., & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co.,
Brown Marx Bldg.,
Birmingham, Ala.

**STEEL BUILDINGS—See
BRIDGES, BUILDINGS, ETC.**
**STEEL DOORS & SHUTTERS—
See DOORS & SHUTTERS**
**STEEL FABRICATORS—See
BRIDGES, BUILDINGS, ETC.**
**STEEL FLOATING AND
TERMINAL EQUIPMENT**
Dravo Corp. (Engin'g Works Div.),
Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div.,
The Koppers Co., Baltimore, Md.
Belmont Iron Works,
22nd St., and Washington Ave.,
Philadelphia, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Brown Instrument Div. of Min-
neapolis Honeywell Regulator
Co., 4462 Wayne Ave.,
Philadelphia, Pa.
Federal Shipbuilding & Dry Dock
Co., Kearney, N. J.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
Western Gas Div., The Koppers Co.,
Fort Wayne, Ind.

STELLITE
Haynes Stellite Co., Harrison and
Lindsay Sts., Kokomo, Ind.

STOKERS
Babcock & Wilcox Co., The,
19 Rector St., New York City.

STOPPERS (Cinder Notch)
Bailey, Wm. M., Co.,
702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

**STORAGE BATTERIES—See
BATTERIES (Storage)**

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works, The,
3917 St. Clair Ave., Cleveland, O.
Lewis Foundry & Machine Co.,
P. O. Box 1586, Pittsburgh, Pa.
Lewis Machine Co.,
3438 E. 76th St., Cleveland, O.
Lozeman Brothers Co.,
3126 Burtleigh St., Milwaukee, Wis.
Medart Co., The,
3500 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The,
New Haven, Conn.
Sutton Engineering Co.,
Park Bldg., Pittsburgh, Pa.

SULPHURIC ACID
Cleveland-Cliffs Iron Co., Union
Commerce Bldg., Cleveland, O.
New Jersey Zinc Co.,
160 Front St., New York City.
Pennsylvania Salt Mfg. Co., 1000
Widener Bldg., Philadelphia, Pa.

SWITCHES (Electric)
Electric Controller & Mfg. Co.,
2698 E. 79th St., Cleveland, O.
General Electric Co.,
Schenectady, N. Y.
General Electric Vapor Lamp Co.,
885 Adams St., Hoboken, N. J.

TACHOMETERS
Brown Instrument Div. of Minne-
apolis Honeywell Regulator Co.,
4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.

TANKS (Pickling)
American Hard Rubber Co.,
11 Mercer St., New York City.
Goodyear Tire & Rubber Co.,
Akron, O.
United States Rubber Co.,
1790 Broadway, New York City.

TANKS (Quenching, Automatic)
American Gas Furnace Co.,
Elizabeth, N. J.

**TANKS (Storage, Pressure,
Riveted, Welded)**
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Bartlett-Hayward Div., The Kop-
pers Co., Baltimore, Md.
Bethlehem Steel Co.,
Bethlehem, Pa.
Petroleum Iron Works Co.,
Sharon, Pa.
Pressed Steel Tank Co.,
Milwaukee, Wis.
Western Gas Div., The Koppers
Co., Fort Wayne, Ind.

**TANKS—WOOD OR STEEL
(Rubber or Lead Lined)**
American Hard Rubber Co.,
11 Mercer St., New York City.
Goodyear Tire & Rubber Co.,
Akron, O.
United States Rubber Co.,
1790 Broadway, New York City.

TAPS AND DIES
Greenfield Tap & Die Corp.,
Greenfield, Mass.
Landis Machine Co., Inc.,
Waynesboro, Pa.

TERNE PLATE—See TIN PLATE

**TESTING MACHINES (Moisture
Tester)**
Alpha-Lux Co., Inc.,
192 Front St., New York City.

THERMOMETERS
Brown Instrument Div. of Min-
neapolis Honeywell Regulator
Co., 4462 Wayne Ave.,
Philadelphia, Pa.
Foxboro Co., The, 118 Neponset
Ave., Foxboro, Mass.
Leeds & Northrup Co., 4901 Sten-
ton Ave., Philadelphia, Pa.

THREAD CUTTING TOOLS
Landis Machine Co., Inc.,
Waynesboro, Pa.

TIE PLATES
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Republic Steel Corp., Dept. ST.,
Cleveland, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Granite City Steel Co.,
Granite City, Ill.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Jones & Laughlin Steel Corp.,
Pittsburgh, Pa.
Republic Steel Corp., Dept. ST.,
Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E.
Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TITANIUM
Vanadium Corp. of America, 420
Lexington Ave., New York City.

TONGS (Rail Handling)
Cullen-Friedest Co., 1308 Kilbourn
Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co.,
McKeesport, Pa.
Haynes Stellite Co., Harrison and
Lindsay Sts., Kokomo, Ind.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works,
3917 St. Clair Ave., Cleveland, O.
Ingersoll-Rand Co.,
11 Broadway, New York City.

**TOOLS (Precision, Lathe, Metal
Cutting, etc.)**
McKenna Metals Co.,
Steel Ave., Latrobe, Pa.

TOOLS (Tipped, Carbide)
McKenna Metals Co.,
Steel Ave., Latrobe, Pa.

**TORCHES AND BURNERS
(Acetylene, Blow, Oxy-Acetylene)**
Air Reduction Sales Co.,
60 E. 42nd St., New York City.
Linde Air Products Co., The,
30 E. 42nd St., New York City.
National Cylinder Gas Co.,
205 W. Wacker Dr., Chicago, Ill.

**TORCHES AND BURNERS
(Air—Gas)**
American Gas Furnace Co.,
Elizabeth, N. J.

TOWBOATS
Dravo Corp. (Engin'g Works Div.),
Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co.,
Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp. (Machinery Div.),
Neville Island, Pittsburgh, Pa.

TRACK ACCESSORIES
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Foster, L. B., Co., Inc.,
P. O. Box 1647, Pittsburgh, Pa.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co.,
Bethlehem, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Columbia Steel Co.,
San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Republic Steel Corp., Upson Nut
Div., Dept. ST., 1912 Scranton
Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad
Co., Brown-Marx Bldg.,
Birmingham, Ala.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The,
13107 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleve-
land Crane & Engineering Co.,
Wickliffe, O.
Harnischfeger Corp., 4411 W. Na-
tional Ave., Milwaukee, Wis.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

TRANSFORMERS
Wagner Electric Corp.,
4904 Baum Blvd., Pittsburgh, Pa.

**TRANSMISSIONS VARIABLE
SPEED**
Link-Belt Co., 220 S. Belmont Ave.,
Indianapolis, Ind.

TRAPS (Steam and Radiator)
Johns-Manville Corp.,
22 E. 40th St., New York City.

TREADS (Safety)
Alan Wood Steel Co.,
Conshohocken, Pa.
Carnegie-Illinois Steel Corp.,
Pittsburgh-Chicago.
Dravo Corp. (Machinery Div.),
Neville Island, Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn
St., Chicago, Ill.
Republic Steel Corp., Dept. ST,
Cleveland, O.
Ryerson, Jos. T. & Son, Inc.,
16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., Neville Island,
Pittsburgh, Pa.

TROLLEYS
American MonoRail Co., The,
13107 Athens Ave., Cleveland, O.
Yale & Towne Mfg. Co.,
4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS
(Electric Industrial)
Atlas Car & Mfg. Co., The,
1140 Ivanhoe Rd., Cleveland, O.
Elwell-Parker Electric Co., The,
4501 St. Clair Ave., Cleveland, O.
Towmotor, Inc.,
1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4530
Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS
(Gasoline Industrial)
Clark Tractor Div., Clark Equip-
ment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The,
4501 St. Clair Ave., Cleveland, O.
Towmotor, Inc.,
1247 E. 152nd St., Cleveland, O.

TRUCKS (Dump-Industrial)
Towmotor, Inc.,
1247 E. 152nd St., Cleveland, O.

TRUCKS (Hydraulic Lift)
Towmotor, Inc.,
1247 E. 152nd St., Cleveland, O.

TRUCKS (Lift)
Clark Tractor Div., Clark Equip-
ment Co., Battle Creek, Mich.
Elwell-Parker Electric Co., The,
4501 St. Clair Ave., Cleveland, O.
Towmotor, Inc.,
1247 E. 152nd St., Cleveland, O.
Yale & Towne Mfg. Co., 4530
Tacony St., Philadelphia, Pa.

TUBE MILL EQUIPMENT
Mackintosh-Hemphill Co., 9th and
Bingham Sts., Pittsburgh, Pa.

TUBES (Boiler)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Babcock & Wilcox Tube Co., The,
Beaver Falls, Pa.
Bethlehem Steel Co.,
Bethlehem, Pa.
Columbia Steel Co.,
San Francisco, Calif.
Jones & Laughlin Steel Corp.,
Pittsburgh, Pa.

National Tube Co., Frick Bldg.,
Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg.,
Pittsburgh, Pa.
Ryerson, Jos. T. & Son, Inc., 16th
and Rockwell Sts., Chicago, Ill.
Standard Tube Co., The, 14600
Woodward Ave., Detroit, Mich.
Timken Steel & Tube Co.,
Canton, O.
Youngstown Sheet & Tube Co.,
Youngstown, O.

**TUBES (Brass, Bronze, Copper,
Nickel Silver)**
American Brass Co., The,
American Metal Hose Branch,
Waterbury, Conn.
Bridgeport Brass Co.,
Bridgeport, Conn.

TUBING (Alloy Steel)
(*Also Stainless)
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
*Babcock & Wilcox Tube Co., The,
Beaver Falls, Pa.
Columbia Steel Co.,
San Francisco, Calif.
*National Tube Co., Frick Bldg.,
Pittsburgh, Pa.
Pittsburgh Steel Co., Grant Bldg.,
Pittsburgh, Pa.
Timken Steel & Tube Co.,
Canton, O.

**TUBING (Cold Drawn Seamless
Steel)**
Babcock & Wilcox Tube Co., The,
Beaver Falls, Pa.
Columbia Steel Co.,
San Francisco, Calif.
National Tube Co., Frick Bldg.,
Pittsburgh, Pa.

Pittsburgh Steel Co., Grant Bldg.,
Pittsburgh, Pa.
Ryerson, Jos. T. & Son, Inc., 16th
& Rockwell Sts., Chicago, Ill.
Standard Tube Co., The, 14600
Woodward Ave., Detroit, Mich.
Timken Steel & Tube Co.,
Canton, O.

**TUBING (Copper, Brass,
Aluminum)**
Bundy Tubing Co.,
10951 Hern Ave., Detroit, Mich.
Shenango-Penn. Mold Co., Dover, O.

TUBING (Phosphor Bronze)
American Brass Co., The,
American Metal Hose Branch,
Waterbury, Conn.

TUBING (Seamless Flexible Metal)
American Brass Co., The,
American Metal Hose Branch,
Waterbury, Conn.

TUBING (Welded Steel)
Bundy Tubing Co.,
10951 Hern Ave., Detroit, Mich.
Jones & Laughlin Steel Corp.,
Jones & Laughlin Bldg.,
Pittsburgh, Pa.
Republic Steel Corp.,
Dept. ST, Cleveland, O.
Standard Tube Co., The, 14600
Woodward Ave., Detroit, Mich.
Youngstown Sheet & Tube Co., The,
Youngstown, O.

**TUMBLING BARRELS (Coke
Testing)**
Brosius, Edgar E., Inc.,
Sharpsburg, Pa.

TUNGSTEN CARBIDE
Allegheny Ludlum Steel Corp.,
Oliver Bldg., Pittsburgh, Pa.
Haynes Stellite Co., Harrison and
Lindsay Sts., Kokomo, Ind.

TUNGSTEN CARBIDE
(Tools and Dies)
Firth-Sterling Steel Co.,
McKeesport, Pa.

TUNGSTEN METAL AND ALLOYS
Electro Metallurgical Sales Corp.,
30 E. 42nd St., New York City.
Vanadium Corp. of America, 420
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Thompson-Gibb Electric Welding
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Budd, Edw. G., Mfg. Co.,
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Lincoln Electric Co., The,
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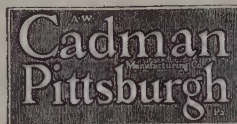
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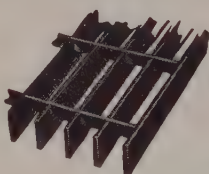
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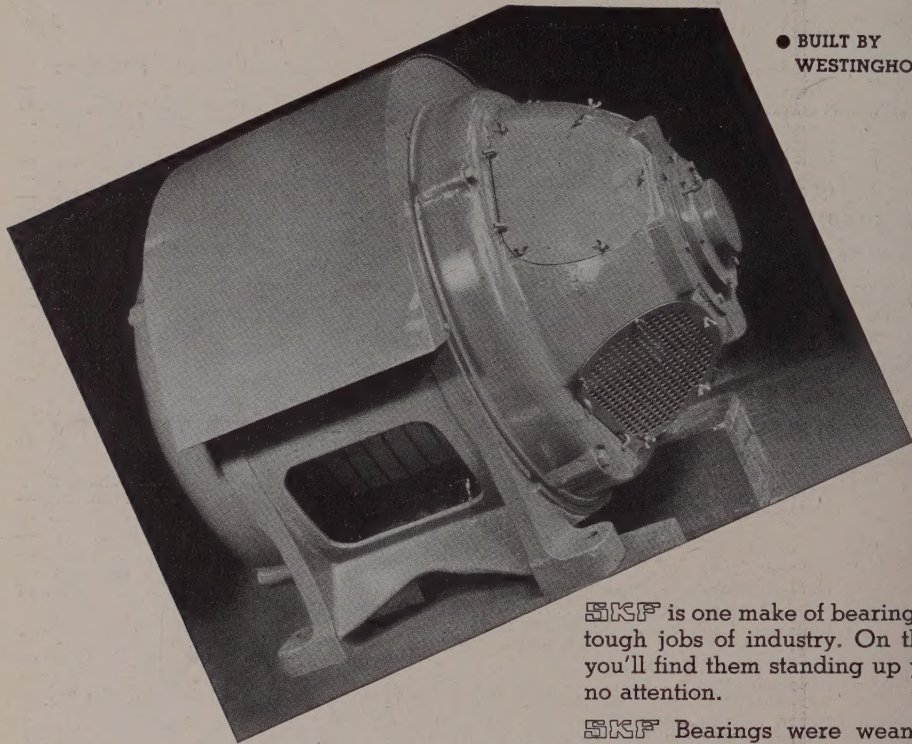
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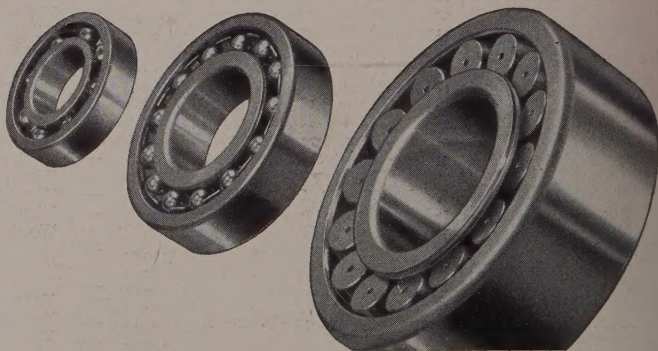
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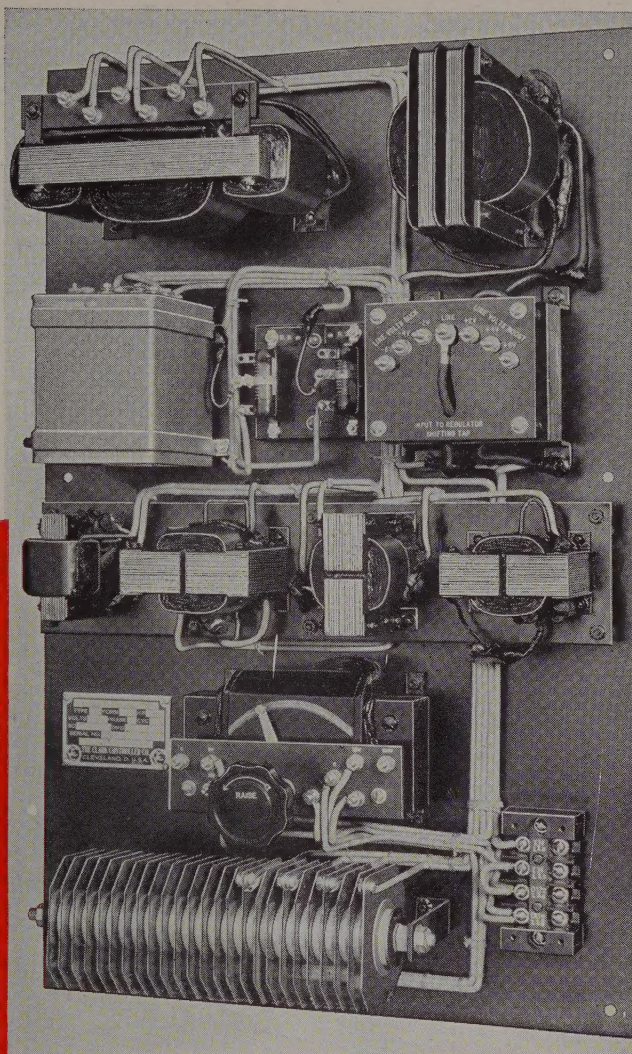
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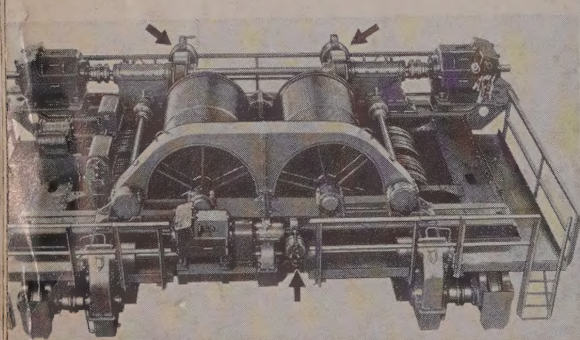
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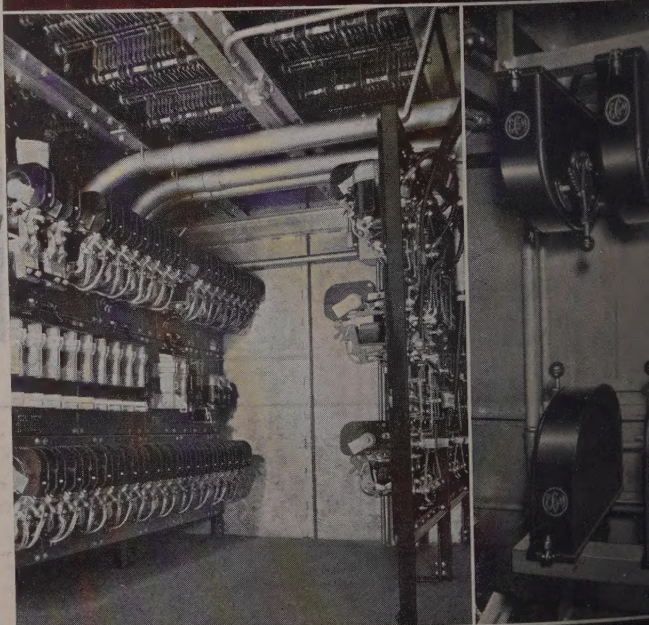
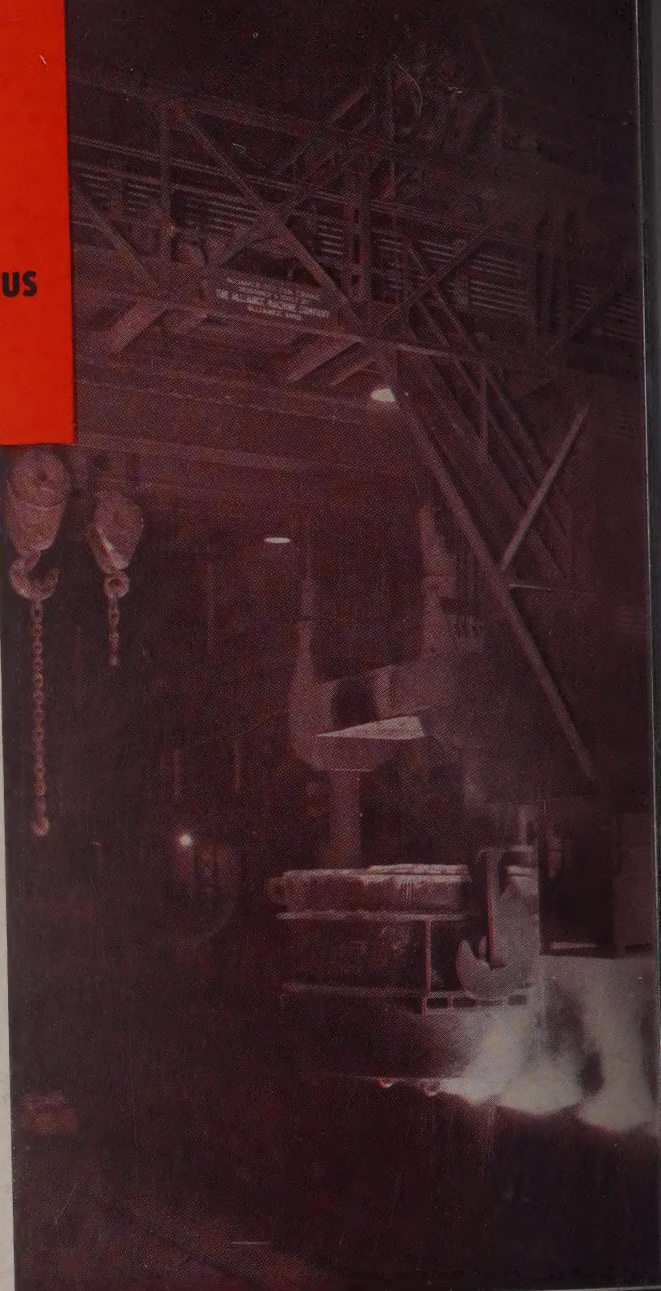
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